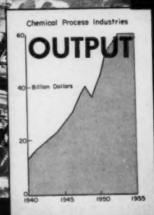
FEBRUARY hemical 1952 Ongineering

EXPANSION





Engineered to reduce pressure loss



Write Dept. H-2 for free booklet on Allowable Working Pressures.

• Looks simple, doesn't it . . . that welding fitting? Not so! It's engineered . . . for shape, for size, for dimensions, for wall thickness . . . all so that it will do its share of the piping job for you . . . without trouble and at top efficiency. True circularity, smooth inner walls, and full radius combine to reduce pressure loss of any flow of fluid. Micrometer-checked uniform wall thickness and forged-in strength combine to assure long-life, dependable service.

All TUBE-TURN Welding Fittings and Flanges are design engineered and held to extremely close manufacturing tolerances giving the utmost in strength, safety and efficiency. You'll find a TUBE TURNS' Distributor in every principal city. Call him for good service in good connections.

Be sure you see the double "tt"

TUBE TURNS, INC. LOUISVILLE 1,

DISTRICT OFFICES: New York - Philadelphia - Pittsburgh - Chicago - Houston - Tulsa - San Francisco - Los Angeles TUBE TURNS OF CANADA LIMITED, CHATHAM, ONTARIO... A wholly ewned subsidiary of TUBE TURNS, INC.



FEBRUARY 1952

/ ENGINEERING WITH CHEMICAL & METALLURGICAL

MANAGING EDITORLester B. Pope SENIOR ASSOCIATE EDITORT. R. Olive ASSOCIATE EDITORCecil H. Chilton EDITORIAL	EDITORIAL DIRECTORSidney D. Kirkpatrick TORRichard V. Reeves SOUTHWEST EDITORJames A. Lee SISTANTFrances Ame MIDWEST EDITORFrank C. Byrnes SISTANTA. J. O'Brien, Jr. WASHINGTON EDITORSR. S. McBride G. S. Bryant, Jr., John Kent
Introduction Plants and Facilities Processes and Technology Supply and Deman	46 Labor
Promising New Pine Gum Process. First All-Glass Paper Excels Modern Paperboard Plant DDT Eyes Fluosulfonic Process Product News	Pictured Flowsheet 246 247 228
How Process Equipment Costs Varied Venture Capital: Risk vs. Opportunity How Dust Collectors Perform Increasing Packing Life Stacks for Pollution Control—I New Way to Detect and Locate Corrosion. Sulphur Cements Plant Notebook	G AND EQUIPMENT 19 Fred M. van Eck 192 R. Dennis, G. A. Johnson, M. W. First and L. Silverman 190 E. L. Spence R. S. Steinbock 200 J. B. McAndrew, W. H. Colner and H. T. Francis Raymond B. Seymour and Robert H. Steiner 300 104
Scrap: It's Got to Come From Somebody's Backya This Year's 8 Big Problems	A N D T R E N D S
Getting Started in Consulting Memo From the Editor Readers' Views and Comments You and Your Job	E AND FIRMS 31: 39 Names in the News 31: 82 Robert Wittenberg 31: 12 Industrial Notes 33:
New Technical Literature Quotes, Extracts and Digests	

February 1950

CHEMICAL ENGINEERING Member ABC and ABP

Vol. 59-No. 2

Published monthly by McGraw-Hill Publishing Company, Inc., James H. McGraw (1860-1948), Founder. Publication Office 99-129 North Broadway, Albany I, N. Y.

Executive, Editorial and Advertising Offices: McGraw-Hill Building, 230 West 42nd St., New York 36, N. Y. Curtis W. McGraw, President; Willard Chevalier, Executive Vice President and Director of Calverising; J. E. Blackburn, J., Yice President and Director of Calverising; J. E. Blackburn, J., Yice President and Director of Calverising; J. E. Blackburn, J., Yice President and Director of Calverising; J. E. Blackburn, J., Yice President and Director of Calverising; J. E. Blackburn, J., Yice President and Director of Calverising; J. E. Blackburn, J., Yice President and Director of Calverising; J. E. Blackburn, J., Yice President and Director of Calverising; J. E. Blackburn, J., Yice President and Director of Calverising; J. E. Blackburn, J., Yice President and Director of Calverising; J. E. Blackburn, J., Yice President and Director of Calverising; J. E. Blackburn, J., Yice President and Director of Calverising; J. E. Blackburn, J., Yice President and Director of Calverising; J. E. Blackburn, J., Yice President and Director of Calverising; J. E. Blackburn, J., Yice President and Director of Calverising; J. E. Blackburn, J., Yice President and Director of Calverising; J. E. Blackburn, J., Yice President and Director of Calverising; J. E. Blackburn, J., Yice President and Director of Calverising; J. E. Blackburn, J., Yice President and Director; J. E. Blackburn, J., Yice President and Treasure; John J. Cooke, Sci. J. E. Blackburn, J., Yice President and Treasure; John J. Cooke, J. E. Blackburn, J., Yice President and Treasure; John J. Cooke, J. E. Blackburn, J., Yice President and Treasure; John J. Cooke, J. E. Blackb



calls for Carbon-Tube

Where acids or acid solutions are to be heated with steam, or where heat must be transferred from liquid to liquid and either or both liquids are corrosive, Swenson Process Engineering frequently recommends the use of Swenson Heat Exchangers with carbon tubes.

LIQUID SCALE COR 125000 /

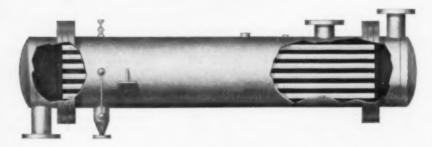
STOR

LEGEND

These Heat Exchangers have proved eminently successful in a great many applications because of their resistance to corrosion, low frictional

resistance, high coefficient of heat transfer, and relatively low original and operating cost. They may be arranged for single or multi-pass operation, as desired.

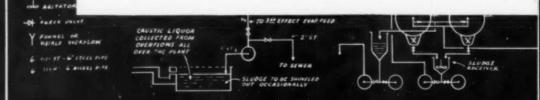
The tube sheet is usually fabricated of lead, lead-covered steel, rubber-covered steel or corrosionresistant alloy-as conditions may require. If the liquid in the shell is corrosive, the shell also may be constructed of these materials.



EVAPORATOR COMPANY SWENSON

Division of Whiting Corporation

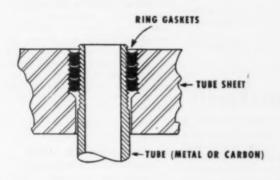
15669 Lathrop Avenue Harvey, Illinois Eastern Sales Office and Export Department: 30 Church St., New York 7, N. Y. In Canada: Whiting Corporation (Canada) Ltd., 47-49 LaPlante Ave., Toronto 2





place by a patented Swenson tube anchorage consisting of a ring-gasketed joint (see illustration). This anchorage relieves the tubes of all stress caused by difference in expansion of the shell and carbon tubes.

Similar construction has been used for several years in Swenson Evaporators for certain types of acid solutions. Let Swenson Process Engineering help you with problems involving heat transfer.



SWENSON

EVAPORATORS . FILTERS . CRYSTALLIZERS

SURAY DRYERS

TITLE FLOW SWEET 4

MATERIAL BALANCE

Chd FM Capacity

Scale 1/2" = 0=1 17

Appr.

Appr.

D - 2 785:

AO Announces

PLASTIC LENSES

Identical with glass in Ontical Properties ... Far Lighter in Weight

HERE IT IS ...

the quality eye protection in plastic lenses many safety directors have wanted . . . the answer for workers who need protection but demand lightness heretofore unobtainable . . . the answer for companies who seek the enthusiastic cooperation of all exposed employees in cutting the high costs of eye accidents.

Made in the World's Cleanest Rooms!

Interested in plastic for years, AO has conducted constant research both in the protective properties of this material and in the atmosphere, facilities and controls required to assure maximum quality in the manufacturing process. In a new safety plant section at Brattleboro, Vermont, where Plastolite plastic lenses are made, all foreign matter is excluded which might impair the quality. Not only are the premises dust-free, lint-free and air conditioned—the workers wear special clothing! What's more, AO Plastolite lenses undergo a multitude of tests and inspections. Result: lenses with the optical properties traditional with AO that conform to the highest known standards!

RECOMMENDED USES:

For workers exposed for long periods... women workers... supervisors, foremen, plant visitors. Especially desirable for electronics work and spot welding. AO Plastolite lenses provide excellent protection against impact particularly where flying particles are small and acid exposures are no problem. NOTE THE LIGHT WEIGHT OF THESE LENSES IN YOUR HANDS AND OVER YOUR EYES!

AVAILABLE ON YOUR FAVORITE AO GOGGLE

AO Plastolite lenses are available as 6 curve lenses in all eye sizes on your favorite AO safety goggle. Your nearest AO Safety Products Representative can supply you with this outstanding advance in eye protection.

AO's Industrial Vision Program Increases Production, Decreases Accidents. Write teday for booklef "Improved Industrial Vision."



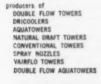
SOUTHBRIDGE, MASSACHUSETTS . BRANCHES IN PRINCIPAL CITIES



Geareducers are designed and built by Marley to do just fone job—drive fans up to 264 inches in diameter—and do it better than any other mechanism. Years of research and field service prove Geareducer design provides everything needed to resist thrust set up by huge fans. This includes oversize taper roller bearings; hardened alloy steel gears of scientifically selected ratio; pumpless, continuous splash lubrication, super-strong shafts and cases.

Every detail of the design has a specific purpose: consider the wide-spread feet for great stability and the magnetic drain plug that retains any loose particles of metal that might cause wear.

In production all machine processes are constantly inspected with exacting care. When completed, every Geareducer is run in, disassembled, carefully checked part by part, completely coated with moisture resistant grease, and reassembled for shipment.

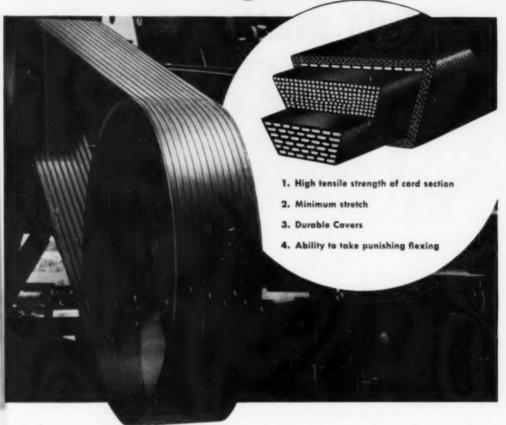




The Marley Company, Inc.

Kansas City 5, Missouri

Look to Bull Dog V-Belts for the "Big 4"!



For peak performance and longer belt life, you need all four — and you get all four with Bull Dog V-Belts.

First, let's look at the BWH Cord Section. It's specially engineered for high tensile strength. That's the only safe way a belt builder can provide and you can obtain the superior load carrying capacity you want. (Also the stamina to absorb shock loads.)

Secondly, Minimum Stretch. Stretch may be desirable in a girdle but not in a V-Belt — if you want less slippage, fewer adjustments, extra belt life!

Durable Covers — you can see how Bull Dog covers stand up! Closely woven, heavy, bias-cut fabric is used to take the severe wearing action where belt and sheave meet. Result: longer wear and sealing against penetration of dirt, grease, moisture.

Last, ability to take heavy flexing is no problem with Bull Dog V-Belts. Compounds are quality-controlled for cooler running. They won't break down or deteriorate.

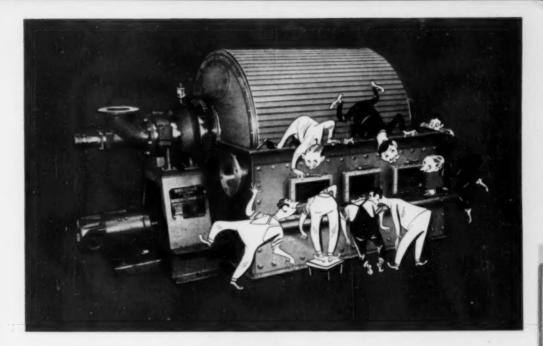
TOUGH PROBLEMS INVITED — Ask your nearest BWH distributor about your V-Belt, transmission belting, conveyor belting and hose problems. He's a specialist! Or write us direct about how to make rubber products work better, longer.



Another Quality Product

BOSTON WOVEN HOSE & RUBBER COMPANY

Warshouse Stock: 111 N. Canal St., Chicago, Illinois Distributors in all Principal Cities PLANT: CAMBRIDGE, MASS. P. O. BOX 1071, BOSTON 3, MASS., U.S.A.



YOU, TOO, HAD BETTER LOOK INTO THIS BIRD-YOUNG VACUUM FILTER

because it offers you these six big advantages over ordinary filters:

- Better use of vacuum full vacuum exerted directly under the filter medium throughout the filtering-washing-dewatering cycle. No hindrances to fluid flow.
- 2 Effective separation of air from filtrate. Air and liquid are kept separate, not mixed and then separated.
- 3 A completely clean filter medium. Positive pneumatic "blow-back" discharges the cake and leaves the filter medium as clean as a whistle. No scrapers or doctors.

- 4 Effective thin cake discharge. This means higher capacity and better washing.
- 5 Thorough, multi-stage, counter current washing with sharp wash liquor separations when desired.
- 6 Easy, quick application of filter media. Multi-panel filter drum construction. No wire winding or strapping. Long service from filter media.

Result: High production per square foot of filter area of well washed, thoroughly dewatered product.

WRITE FOR NEW BULLETIN

BIRD MACHINE COMPANY

SOUTH WALPOLE . MASSACHUSETTS

The platinum metal catalysts are now used for...

HYDROGENATION · OXIDATION
DEHYDROGENATION · RINGCLOSURE
DOUBLE BONDS · NITRO GROUPS
ALDEHYDES · AROMATICS · KETONES

PHARMACEUTICALS · VITAMINS
TERPENES · HYDROCARBONS · GASOLINE
DYESTUFFS · INTERMEDIATES
AMMONIA OXIDATION
HYDROGEN CYANIDE

PURIFICATION OF
HYDROGEN, NITROGEN.
PRODUCTION OF
INERT ATMOSPHERES.
REMOVAL OF OXYGEN,
CARBON MONOXIDE FROM GASES.

A gram

BAKER RESEARCH SERVICE: Here, the world's largest platinum metal catalyst research and production facilities are maintained for service to you. If catalysis is a part of your present production or if you are contemplating a new process involving a catalytic stage, it may very likely be to your advantage to discuss (in full confidence of course) your catalyst problems with us.

THE LOW COST OF PLATINUM CATALYSIS: Platinum catalysis is in many instances far more economical in actual use than the base metals and oxides. Platinum metals in spent catalyst are recovered or reconverted to new catalyst by Baker at such low cost that its use facilitates economies (holding catalysis costs to pennies-perton) even in large-volume operations.

Platinum metals catalysts have many important advantages that warrant your investigation. * *

PLATINUM PALLADIUM RUTHENIUM RHODIUM IRIDIUM OSMIUM

BAKER L COMPANY, INC. CATALYSTS

113 ASTOR STREET . NEW ARK. N. J.

THE HUB OF PLATINUM METALS RESEARCH



Advanced engineering pays off in increased production . . . reduced handling costs

Here's the biggest advance in materials handling in years - Link-Belt's "PA" Oscillating Conveyor. "PA" stands for positive action-action that moves large volumes of material so gently that even a cigarette ash can travel the entire run intact.

But that's only part of the story! "PA" Oscillators are compact-a "natural" for passing congested locations. More-they're leak-proof-can be totally enclosed for dust- or gas-tight service. For other applications, they've been steam- and water-jacketed ... even louvered. Field tested-hundreds of successful installations.

never before practicable

As for versatility - you can install dividers to handle more than one material at a time without mixing . . . discharge at any desired points. Maintenance, too, is lower-no joints in trough, no return runs to require attention-low operating frequency.

If you have a handling trouble spot, Link-Belt's "PA" Oscillator may be the answer. Book 2244 gives full information.

CHECK THESE 9 CONVEYING ADVANCES

- 1. "PA" POSITIVE ACTION-uniform flow, regardless of surges. Spring action reduces forces imum horsepower.
- 2. LEAK-PROOF can be made dustor gas-tight.

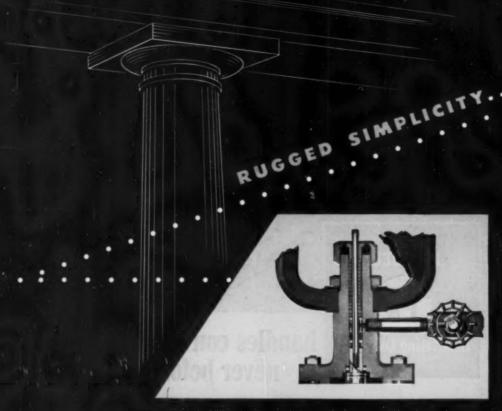
 3. SANITARY - completely self-
- cleaning.
 4. COMPACT requires opening
- only slightly larger than trough.
- 5. LONG LIFE-all-metal, few mov-
- ing parts.
 LOW MAINTENANCE only drive is lubricated.
- GENTLE-no breaking down of material 8. VERSATILE-for a few pounds or
- 200 tons per hour.

 9. ECONOMICAL -- particularly for longer runs.



OSCILLATING CONVEYORS

LPHK-BELT COMPANY: Chicago 9, Indianapolis 6, Philadelphis 40, Atlanta, Houston 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8, Springs (South Africa). Offices in principal cities.



through one-piece bonnet construction



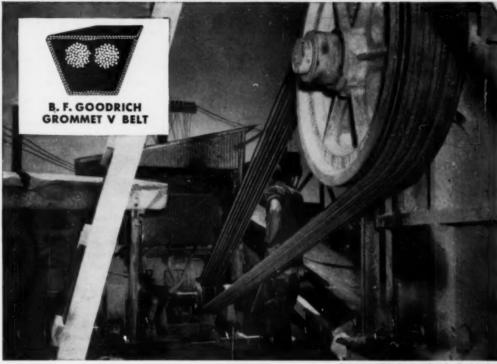
The rugged, jointless, steel bonnet of the Honeywell Series 700 Valve affords greater strength, simpler disassembly for inspection and maintenance. has deep, integral stuffing box built to superior performance standards, top-and-bottom packed lantern gland to minimize leakage. The Honeywell Series 700 wide band proportioning valve comes in a full range of styles and sizes... has all the features you look for in a fine valve. Write today for your copy of Bulletin 700-3.

MINNEAPOLIS-HONEYWELL REGULATOR Co., Industrial Division, 1904 Windrim Ave., Philadelphia 44, Pa.

Honeywell

First in Controls





Production increased 25 per cent with B. F. Goodrich grommet V belts

B. F. Goodrich often cuts belt costs 20 to 50 per cent

THESE belts drive a rock crusher 9 hours a day, six days a week. In addition to the long hours belts are exposed to dampness, oil and sharp grit. Still worse, the crusher abuses the drive with every impact of its jolting, grinding action. Previously, the operators had "tried everything" including flat belts, other V belts, even a chain drive. But mechanical trouble and production hold-ups continued.

The B. F. Goodrich grommet belts were tried at the suggestion of a BFG distributor's salesman. When the picture above was taken the grommet belts had been in operation almost 2 years. The grommet belts' record: production up 25%, large savings in labor and maintenance time, no belt replacement costs, better working conditions

for men-less noise, greater safety. BFG groinmet belts can be counted on to save because of:

No cord ends-A grommet is endless, made by winding heavy cord on itself to form an endless loop. It has no overlapping ends. Because most of the failures in ordinary V belts occur in the region where cords overlap, the endless cord section in a grommet V belt eliminates such failures.

Concentrated cord strength-All of the cord material in a B. F. Goodrich grommet multiple-V belt is concentrated in twin grommets, positioned close to the driving faces of the pulley. No layers of cords to rub against one other and generate heat; cord and adhesion failures are reduced.

Better grip, less slip - Because a

grommet is endless, a grommet V belt is more flexible, grips the pulleys better. Size for size, grommet multiple-V belts will give 1/3 more gripping power, pull heavier loads with a higher safety factor.

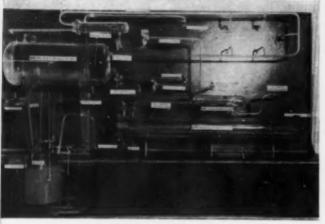
Only B. F. Goodrich bas the grommet!-No other multiple-V belt is a grommet V belt (U.S. Parent No. 2,233,294). Now available in C, D and E sections. See your local B. F. Goodrich distributor. The B. F. Goodrich Company, Industrial & General Products Division, Akron, Obio.

Grownet Betts E Goodrich

BRIDGEPORT BRASS COMPANY

COPPER ALLOY BULLETIN

"Bridgeport" MILLS IN BRIDGEPORT, CONN. AND INDIANAPOLIS, IND. — IN CANADA: NORANDA COPPER AND BRASS LIMITED, MONTREAL



Plastic model of a hot process water-heating system for laundries, textile plants and process industries. Saves 30 to 60% fuel. Relieves overloaded boilers. Courtesy: The Patterson Kelley Company, Inc., East Stroughbure. Pa.

Reclaiming Waste Heat Pays Big Dividends

Since every cloud of steam escaping into the atmosphere and every discharge of warm liquids into sewers represents loss of valuable heat, it is no wonder that much thought is being given to the recovery of waste heat which may represent from 30 to 60% of the fuel used for generating steam.

Lower Fuel Bills

Every plant using an abundance of hot water or steam for processing, washing, cooking, sterilizing, heating, etc. is a potential prospect for making worth-while savings in its fuel bill and thereby reducing its cost of operation. In many instances the cost of special equipment for reclaiming waste heat will pay for itself in one or two years and represents an excellent investment.

The illustration above shows a plastic model of a water heating system for laundries, textile plants and process industries. Laundries generate steam and use about two-thirds of it for making hot water and the balance for presses, flatwork ironers and driers. The production of hot water represents the highest cost of operation. To reduce the cost of heating water it is necessary first to reclaim the heat from the hot waste water; second, the heat from exhaust steam; and thirdly, from high pressure condensates.

The hot water which ordinarily drains through the sewer and has a temperature between 120 to 130° F is first drained through screens to hold back foreign matter and is discharged into a sump from which point it is picked up by a non-clog, self-priming pump which forces the water through the tube of a closed type reclaimer.

Heat Salvaged from 4 Sources

Incoming fresh, clean water is circulated on the outside of the tubes, which are generally made from copper. The temperature of the waste water in the exit end of the reclaimer drops between 70 to 80° F and brings up the temperature of the fresh water entering between 40 to 55°F to from 90 to 110°F. After it leaves the reclaimer the waste water is discharged to the sewer while the heated fresh water goes to the condensate cooler. Here it picks up heat from the condensate, from high pressure steam from the machine, and from the booster heater in the plant. It then goes to the hot water storage heater. Exhaust from the steam water is condensed through a copper tube nest in the storage heater and raises the temperature of the water in the storage tank to approximately the temperature required for processing.

Temperature and Pressure Held Constant

A circulating pump is used to discharge water from the storage heater to the booster heater, to maintain a constant temperature, generally 180° F, and a constant pressure to the washroom or processing machine. This water is continually circulated to maintain a uniform temperature and pressure.

Coils of tubes are either of copper or Admiralty brass or one of the other condenser tube alloys depending on the corrosive nature of the waste liquid. Duplex tubes are required whenever two different corrosive liquids are involved. Duplex tubing can be made in various combinations of materials to offset most kinds of double corrosion conditions. Combinations of Admiralty brass, aluminum bronze, aluminum brass, copper, cupro nickel, Muntz metal, naval brass, silicon bronze, aluminum, lead, nickel, low-carbon steel and stainless steel are popular. (2881)



She's looking through someone else's eyes

Few purchases are made without thought of how they will be judged by others.

Men who order more than 85 per cent of all Multiwall bags are well aware of this. They rate* a good impression high on their purchasing check list. This, of course, includes a good printing impression.

When your Multiwall bag puts its best foot forward visually, you take a long step toward both winning and holding your customer.

The use of what you sell, and the re-orders you receive,

inevitably are influenced by your bag - how it looks, how easy it is to read, how easy it is to remember.

Most often, the best-dressed Multiwalls are Union Multiwalls. This is one of many good reasons why the biggest users of Multiwalls today look to Union for a greater proportion of their needs than at any other time.

More so every day . . .

IT'S UNION FOR MULTIWALLS



*August, 1951 research study.



Tips on Better Pumping

SELECTING THE RIGHT MATERIALS FOR CHEMICAL SERVICE PUMPS—

In choosing pump materials, the considerations are, naturally, economy and availability of the material, as well as its suitability for construction. For instance, iron with bronze fittings should be used wherever possible for greatest economy—as in handling ammonium nitrate, methyl accetate, etc.

SULPHURIC ACID

95 to 100% concentration, use all iron. All lead has the lowest rate of corrosion for any concentration up to about 55% hot or cold, and very good resistance from 55 to 75%, hot or cold. For 75% to 95%, hot or cold, Monel works best.

HYDROCHLORIC ACID

—for cold hydrochloric, medium and soft rubber lined pumps are recommended; for hot concentrated acid, Hastelloy B.

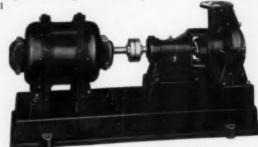
CAUSTIC SODA

—for cold solution, all iron is entirely satisfactory. For high temperatures all nickel gives the lowest rate of corrosion.

Buffalo

DATA & ADVICE YOURS FOR THE ASKING

"Buffalo" engineering bulletin No. 982 describing a complete line of pumps in most machineable alloys and rubber-lined—plus materials tables from Standards of Hydraulic Institute—write for your copy of this useful bulletin. And for experienced, competent engineering advice, "Buffalo" engineering representatives in principal cities are always "at your service".



RUBBER-LINED

This "Buffalo" Chemical Pump is designed to handle chlorinated solutions, concentrated hydrochloric, solutions containing abrasive solids and many other highly corrosive limids.



For hot or cold sulphuric, all strengths, sulphurous acid, alum, ammonium sulphate and copper sulphate. This "Buffalo" Pump has extra thick casing walls and impellers to stand high impeller speeds and casing pressures.

BUFFALO DUMPS INC.

BUFFALO, NEW YORK

Canada Pumps Ltd., Kitchener, Ont. Sales Representatives in all Principal Cities

A BETTER CENTRIFUGAL PUMP FOR EVERY LIQUID

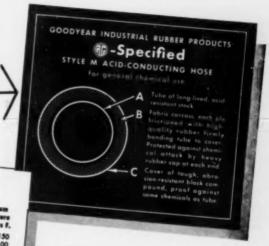
Check YOUR HOSE NEEDS

and meet them with this <u>one</u> hose!

GOODYEAR STYLE M ACID HOSE Handles All These Chemicals:

1	- controls:		
ACIDS	Maximum Concentration	Mexima Temperate	
Arsenic			
Acetic	50% 50%		
Carbonic	50% 50%		
Citrie	30%	The state of the s	
Fluoboric	JO%	The state of the s	
Fluosilicic	ALL	15	
Formic	ALL	Janean J	
Hydrobromic	ALL	Marie Marie 15	
Molie	A11	100	
Photohosis	All	100	
Sulfucia	75%	Street Contraction 30	
Tonnic		1.50	
Taringia	All	125	
Hydrochlosis	ALL ALL J6% (or Conc.)	150	
	36% (150	
BASES	(or Conc.)	125	
Polossium M.	SON ALL	150	
	The state of the s	700	
Copper Sulphate Ferric Chloride	ALL	150 150 150 150 150	

1.50 increasing as concentration and temperature combinations combinations of the day to expected to diministry temperature, are being successfully bendled, there is sidered individually, as are unlisted days.





FOR HOSE, FLAT BELTS, V-BELTS, MOLDED GOODS, PACKING, TANK LINING, RUBBER-COVERED ROLLS built to the world's highest standard of quality, phone your nearest Goodyear Industrial Rubber Products Distributor. Look for him in the yellow pages of your Telephone Directory.

GOODFYEAR

THE GREATEST NAME IN RUBBER

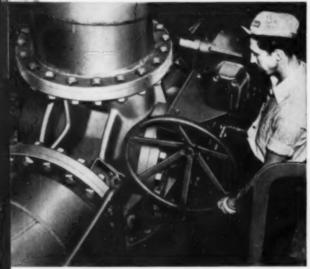
We think you'll like "THE GREATEST STORY EVER TOLD"- Every Sunday - ABC Nessork

Nordstrom Valves Prove Suitability

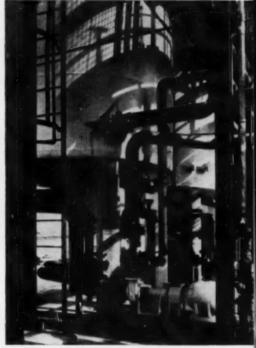
EXAMPLES: Chloromycetin, Ethylene Cyanohydrin, Brine, Calcium



VARNISH—After processing each batch of varnish, a California point menufacturer pumps varnish base through this monifold of Nordstrom three-way, three-port valves. One operator can divert varnish to six thin-down and bunding tanks. Vapor-tight, lubricant-sealed Nordstrom valves turn easily even in thes carrying varnish of high viscosity.



BRINE—At Trong, Calif., in a desert chemical plant, 24-inch four-way Nordstrom valves like these are used for flow line reversal. Through them, brine is pumped from Searles Loke to plant to be converted into potash, soda ash, barax, salt cake and other products. Ordinarily, four straightway valves would be required in place of each of the Nordstrom four-way valves. Flow is reversed marely by ratating valve plug 45 degrees.



ETHYLENE CYANOHYDRIN—A base in the manufacture of acrylates used in such products as coatings for leather, textile finishes and adhesives, ethylene cyanohydrin is in turn manufactured in Nordstrom-equipped unit at Texas plastics plant near Houston. Gear, wrench and chain operated Nordstrom valves simplify opening and closing of suction and discharge lines.



CHLORINE—Niagara Falls, N.Y. chemical plant, produces chlorine in wet gas form, then dries it and compresses it to a liquid for use in industry. Nordstrom valves on pump and process lines control the chlorine prior to liquefying.

for Tough Chemical Services

Hypochlorite, Varnish, Chlorine, Ethylene and Propylene Glycol





CALCIUM HYPOCHLORITE—A basic ingredient in the manufacture of book matches, calcium hypochlarite bleach liquor is handled by these Nordstrom valves in upstate New York plant of big match maker. Other Nordstrom controlled lines in the plant corry lime slurry and chlorine.

In the process industries, in some of the most erosive and corrosive services to which valves are subjected, there are thousands of successful, trouble-free Nordstrom valve installations. Those shown here are typical.

Nordstrom valves, with the extra seal and protection of lubricated seating surfaces and the hydraulic jacking action that keeps the plug in free working condition, are made in a whole series of patterns and metals especially for the process industries.

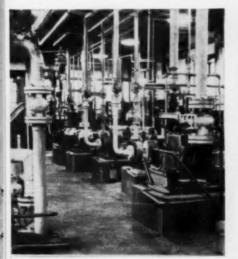
For example, Nordstroms can be had for not only straightway flow but in a variety of three-way and four-way designs as well, ideal for piping arrangements calling for switching flow from line to line.

Among the metals in which Nordstroms are built are Type 316 Stainless Steel, Nickel, Monel, Type No. 2 Ni-Resist, Nordco Bronze, Hastelloy B, and Mercoloy, all chosen for special resistance to various chemicals.

If you specify valves or meters for process lines you should have a copy of the new Bulletin, "Nordstrom Valves and Rockwell Meters for the Process Industries."

Write Today for Free Process Industries Bulletin





PROPYLENE GLYCOL—Glycols, being hard to freeze and slow to boil, find use in anti-freezes and coolants and are also softening agents for textiles, cellophane, tobacco, glue, cark and paper. In processing glycols, Nordstrom valves are widely used by Michigan chemical plant. In the cold pump room above, for example, Nordstroms regulate flow of ethylene and propylene glycol.



CHLOROMYCETIN — This 5000 gallon Nordstrom volve-controlled fermenter in laboratories of Detroit pharmaceutical manufacturer is a key step in processing of the wander drug, Chloromycetin. Several hundred Nordstroms in sizes from ¾ to 20 inches, straightway and Multiport types, in stainless and semi-steel and type No. 2 Ni-Resist are used in the process lines of this company's antiblobic division.

Typical Applications of Nordstrom Valves in the Process Industries

Beverage Plants
Chemical Plants
Chemical Plants
Explosive
Manufacturing
Food Plants
Gas Pipe Lines
ice and Refrigeration
Oil Well Drilling

Paint and Lacquer Mills Synthetic Plants Plants Synthetic Plants Plants Synthetic Rubber Plants Patroleum Refineries Tautile and Dye Plants Pharmaceutical Plants. Water Works

Power and Steam Plants Rubber Milhs Sewage Plants Smelters and Mines Soap Fectories Steel Mills Segar Refineries Synthetic Ammonia Plants Synthetic Fiber Plants Synthetic Fiber Plants Synthetic Fiber Plants Synthetic Rubber Plants Tenneries

Rockwell : Built



Nordstrom Valves

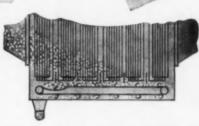
Lubricant Sealed to Keep Upkeep Down

ROCKWELL MANUFACTURING COMPANY

400 N. Lexington Ave., Pittsburgh 8, Pa.







This Koppers "packaged" mechanical or vacuum tube power pack is not restricted to an area near the precipitator. It can easily be installed in any convenient place in the plant. Result: Compact designs! More flexibility! This Koppers exclusive—the bottom drag scraper—provides continuous dust removal. Cumbersome hoppers are eliminated and dust handling is simplified. Result: Lower operating costs! Less space requirement!

Here are two ways Koppers engineers simplify precipitator operation for you!

PERFORMANCE GUARANTEED!

Koppers engineers protect your investment in an electrostatic precipitator by guaranteeing both the recovery or gas-cleaning efficiency and the residual content left in the gas after cleaning. Koppers-Elex electrostatic precipitators are designed, engineered, fabricated, efected and guaranteed under one contract by Koppers Company, Inc.

IN ADDITION to high efficiency, Koppers concentrates on the practical aspects of electrostatic precipitator design. Shown above are just two of the many practical features which simplify operation.

Besides these compact power packs and the continuous dust removal features, Koppers-Elex electrostatic precipitators may be of the multiple-chamber type. This means one chamber may be shut down for inspection or maintenance without stopping the gas-cleaning action. The dirty gas is simply diverted through other chambers where cleaning continues.

Because rapping is sectionalized, re-entrainment is minimized. And because successive collection fields can be separately energized, maximum voltage can be applied to each field—with higher gas-cleaning efficiency resulting. Pressure drops are negligible.

IF YOU HAVE A GAS-CLEANING PROBLEM, write and outline the details for us to review. There is no obligation. Just address your letter to: KOPPERS COMPANY, INC., Precipitator Dept., 212 Scott Street, Baltimore 3, Maryland.



Koppers-Elex ELECTROSTATIC PRECIPITATORS



Teamed for tops

OUTDOOR
SPLASHPROOF MOTOR
BY ELLIOTT



Elliott outdoor motor in operation under spray test at factory.

ON THE DRIVING END, the motor that is rapidly becoming famous throughout industry for its ability to operate anywhere in the open, absolutely unprotected, quite unaffected by any climatic condition, snow, rain, sleet, fog, dust storm, heat or cold. Over 200,000 hp of these Elliott splashproof motors have been purchased for installation in all parts of the United States for the widest range of conditions.

ELLIOTT

With the cost of housing eliminated, and location limitations thrown overboard, these big Elliott motors have turned a new page in industrial plant design and costs. Available from first size above NEMA frames and larger. Call or write your nearest Elliott District Office for consultation.

ELLIOTT

Ridgway Division . Ridgway, Pa.

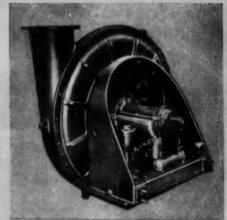
PLANTS ALSO AT: AMPERE, N. J. . SPRINGFIELD, O. . NEWARK, N. J.

in reliability!

HIGH PRESSURE CENTRIFUGAL BLOWER BY ELLIOTT

AT THE DRIVEN END, one of the highpressure gas circulators that Elliott builds, for operation in a closed system, suitable for discharge pressures up to 1000 psig or more.

Elliott centrifugal blowers are custom-built to the requirements of the installation. They are characterized by unusually rugged construction throughout and several large multi-stage units have recently made some outstanding authenticated records for continuous operation and low maintenance. Built for motor drive, motor geared drive or turbine drive. Call or write your nearest Elliott District Office for consultation.



Typical Elliott single-stage blover, for turbine or motor drive.

Company

Centrifugal Blower Dept. • Jeannette, Pa.

DISTRICT OFFICES IN PRINCIPAL CITIES

Œ

Stainless Steel · Lead · Wood and Steel . . . Gustom-Built Equipment for the Chemical and Food Processing Industries

ACID PLANTS - CHEMICAL PLANTS - PAPER and PULP MILLS - DREWERIES - FOOD PLANTS - DAIRY PLANTS - RAYON PLANTS
TEXTILE PLANTS - PETROLEUM REFINERIES - BLEACH and DYE HOUSES - BEVERAGE DISPENSERS - MEAT PACKING PLANTS



STAINLESS STEEL LEAD

WOOD · STEEL

O. G. KELLEY & CO.

DESIGNERS

FABRICATORS

96 TAYLOR ST.,

BOSTON 22, MASS.





alkali or films





paper or CHEMICALS

★ No matter what you process it will pay you to check into the Bailey simplified electronic control system.

With four basic circuits and eight basic component parts you can get more than 100,000 different electronic instrument and control combinations. Your problems of measuring and controlling flow, level, speed, pressure temperature, gas analysis, pH, conductivity, etc., can be solved by the right combinations of these 4 circuits and 8 basic parts.

You don't have to load up a stock room with parts. Bailey parts are interchangeable. What you used for the last combination is good for the next one when conditions in your plant change. You can save money, as others are doing, when you standardize on Bailey controls.

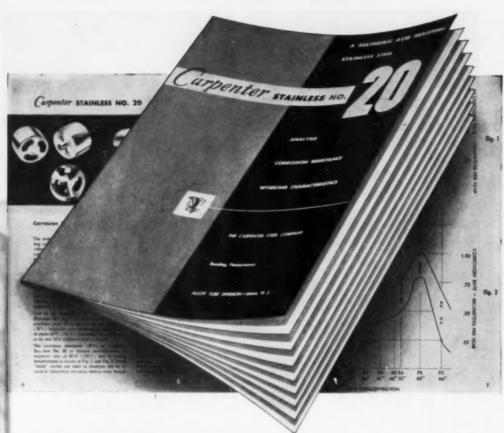
Bulletin No. 17 will show you how easy it is to install and use Bailey electronic controls. Write for your copy today.

you'll find Bailey Controls on the job

P.28

BAILEY METER CO.

1054 IVANHOE RD. • CLEVELAND 10, OHIO Builey Motor Company Limited, Mentreal, Canada Controls for the Process Industries
TEMPERATURE • FLOW • PRESSURE GAS ANALYSIS • LEVEL • RATIO



This New Book Gives You Latest Data on Carpenter Stainless No. 20

This new book is part of Carpenter's service to engineers interested in improved processes and longer equipment life through better corrosion resistance. Its 20 pages contain factual engineering data on the alloy's resistance to a number of corrodents such as sulphuric acid, plating and pickling solutions, acetic acid, etc.

Information on No. 20's electrical and physical properties and its workability is also included. 43 field reports from users of No. 20 show how this Stainless compares with other materials. No. 20's excellent resistance to sulphuric acid at various concentrations and temperatures is described in several of the reports.

A copy of the new Carpenter Stainless No. 20 book will be a useful addition to your Future Planning file. For your copy, just drop us a note on your company letterhead, indicating your title.

The Carpenter Steel Company, 127 W. Bern St., Reading, Pa.

Carpenter STAINLESS



If you now have a copy of the typewritten bulletin on Carpenter No. 20, by all means replace it with this new book about No. 20.

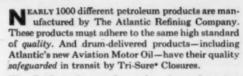
Licensed under notants of the Durison Co. Inc.

ATLANTIC quality is delivered

-in drums protected by Tri-Sure Closures

agkast

AVIATION



The Tri-Sure flange, plug and seal guard against leakage, tampering, and undetected pilferage. And this fact is proved by the experience of leading shippers like Atlantic who, year after year, entrust their products and prestige to Tri-Sure protection.

When you order drums, order security for your product...order freedom from spoilage and losses ... by specifying "Tri-Sure Closures".

"The "Tri-Sure" Trademark is a mark of reliability backed by 29 years serving industry. It tells your customers that genuine Tri-Sure Flanges (inserted with genuine Tri-Sure dies). Plugs and Seals have been used.

AMERICAN FLANGE & MANUFACTURING CO. INC. 30 ROCKEFELLER PLAZA, NEW YORK 20, N. Y. Tri-Sure Products Limited, St. Catharines, Ontario, Canada



a milestone . . .

along the road to more abundant harvests is this historic lime kiln. But hard work produced irregular results at best by this old fashioned method.



Traylor Retary Kilne have earned world-wide regard for the high efficiency and rugged endurance built into them. Each kiln is designed to fit the job it will do. For complete information, ask for Traylor Bulletin 115.

TODAY, scientific farming requires a multitude of agricultural chemicals to rebuild soils and increase crop production. With this need came the demand for more precise methods and machinery for manufacturing fertilizers.

For 50 years, Traylor has played a leading part in the development and production of better machinery for the processing industries. In that time, producers the world over have come to depend on the experience and skill only Traylor can draw upon to provide them with modern equipment for peak performance. They know it's experience that counts. Traylor has experience—half a century of it.



ENGINEERING & MANUFACTURING CO.

411 MILL ST., ALLENTOWN, PA.
Sales Offices: New York • Chicago • Les Angeles
Canadian Mirs: Canadian Vickers, Ltd., Montreal, P. Q.

A TRAYLOR LEADS TO



GREATER PROFITS



CONTINUOUS
OPERATION
is all important
in processing

- to speed production
- · cut costs
- improve quality

The answer to faster, better processing is uninterrupted continuous separation or clarification with De Laval centrifugal machines. Only when separation and clarification are performed as part of an uninterrupted process can maximum profitable operation be obtained.

De Laval centrifuges have three basic applications: (1) continuous separation of two liquids, (2) continuous clarification of one or two liquids and (3) continuous separation of two liquids plus the simultaneous continuous removal of solids from one or both liquids.

For each form of centrifugal separation, De Laval has a specially designed machine. Several of these are available in different sizes and capacities. De Laval may already have tested materials similar to yours—consult one of their engineers.

THE DE LAVAL SEPARATOR COMPANY
Poughkeepsie, New York 427 Randolph St., Chicago 6
DE LAVAL PACIFIC CO., 61 Beale St., San Francisco 5
THE DE LAVAL COMPANY, Limited, Peterborough, Ont.

De Laval

for CONTINUOUS Separation with Centrifugals

CHAPMAN LIST 960



An exceptionally wide range of services is covered by this small forged steel gate valve . . . giving you the same consistent top level performance on many different jobs.

Chapman List 960
Forged Steel Gate Valves are manufactured in sizes from ½" to 2" inclusive, and in these 2 types:(1)
Rising stem with yoke (shown), and (2) Rising stem with inside

screw. Bonnet joints are either gasketed or metal-to-metal. Pressure range: 2000 lb. at 100°F. — 380 lb. at 1000°F. Forhigher pressures, specify List 990. Send for illustrated Catalog No. 10.

THE CHAPMAN VALVE MFG. CO., INDIAN ORCHARD, MASS.

better instrumentation for

DUALITY CONTROL



Among the important contributions made by fexbere to industrial instrumentation are many systems which adapt exacting laboratory quality control measurements to continuous plant production use. Unequalled application experience, plus a complete diversity of premium quality instruments, enables fexbore to offer you a wide variety of automatic systems for the measurement and control of product quality.

INDICATORS . RECORDERS . CONTROLLERS

Systems based as measurements of conductivity, pit, disloctric contact, exiderion-reduction potential, balling poli₁, rise, differential vapor pressure, specific gravity...

TRANSMISSION SYSTEMS . CONTROLLED VALVES

FOXBORO

For over 40 years, specialists in the measurement and control of temperature, pressure, flow, liquid level, humidity . . .

THE FOXBORO COMPANY, FOXBORO, MASSACHUSETTS, U.S.A.



PYREX brand Glass Pipe Features



EASY TO INSTALL. There are tricks to handling any material, but the tricks to handling PYREX brand Glass Pipe are quickly learned. It can be plumbed at your plant. Prefabrication to your requirements is unnecessary. One plant superintendent says, "PYREX piping can be easily installed. I cannot remember when we had any difficulty with installation or reinstallation after changes or repairs."



FLEXIBLE HOOK-UP5. You can hook glass pipe to iron, steel, stoneware or any other piping material. Corning supplies fixtures and adapters to meet most needs. Special fixtures can be made for extraordinary requirements. Says one chief engineer, "Glass installations have the advantage of being flexible, as compared to metallic materials."



IT'S TOUGH. You can't hit PYREX brand "Double-Tough" Glass Pipe with a hammer or slug it with a wrench, but it is a rugged, easy-



to-handle material. An acid plant superintendent says, "Its transparent feature more or less insures due care by everyone coming in contact with PYREX pipe." A plant manager says, "We started to work with PYREX pipe in 1937. We've had no breakage to speak of."

VISIBILITY. "Often the visibility afforded by PYREX pipe aids tremendously in the ease with which chemical processes can be carried out," observes the manager of a chlorine plant. Trouble can't bide behind glass.



AVAILABILITY. PYREX brand "Double-Tough" Glass Pipe is available in diameters of 1", 1½", 2", 3", 4" and 6" I.D. in standard lengths up to 10 feet. Fittings, including 45° and 90° elbows, tees, reducers, crosses are also available in all sizes. In addition, laterals and U-bends are available in 1" to 4" sizes. Plug valves are available in 1" and 1½" sizes. Balanced stocks are always on hand. Send for catalog.



CORNING GLASS WORKS, CORNING, N. Y.

Corning means research in Glass

VISIT THE NEW CORNING GLASS CENTER



eats your pipelines,

specify PYREX "DOUBLE-LOUGH" Glass Pipe

It's corrosion and heat resistant, transparent, chemically stable, strong - and it can be plumbed in your plant.

The production manager of a well-known chemical plant reports: "Besides our problem of corrosion, the necessity of maintaining color standards for our products has made glass the ideal piping material in some of our processes. We have used glass pipe in this plant for many years and couldn't do without it."

BREAKAGE NO PROBLEM ... "We have very slight breakage. A piece of heavy sheet iron separates a glass inlet to a distillation kettle from some nuts that have to be removed occasionally with a wrench. Some close-mesh steel wire netting protects pipelines from overhead catwalks. That's all it takes to make breakage very unlikely. We don't worry about it."

STANDS HIGH TEMPERATURES ... "One of our lines is hooked up to a distillation kettle heated by a steam jacket to 195° C. The vapors are condensed in a 3-inch PYREX pipe with cold water jackets. When we change the chemical substance to be distilled, we disconnect the pipe and clean it with steam to remove all traces of the previous distillate, especially the odor. This is a very simple change."

NOW STRONGER THAN EVER ... The new PYREX "Double-Tough" Glass Pipe makes breakage even more unlikely. It is made from heavy-wall machine-drawn tubing. A new heat-treating process doubles the strength of the ends of straight lengths and of all standard fittings except U-bends.

Your Corning Distributor stocks PYREX brand "Double-Tough" Glass Pipe and a line of fittings to meet your requirements. Call him today for more detailed information or send the coupon at right direct to Corning.

Authorized Distributors of PYREX brand "Double-Tough" Glass Pipe

A. J. Eckort Company

Glass Engineering Laboratories Release California

Fred S. Hickey, Inc. Chicago 44, Illinois

Valley Foundry & Machine Works Fresno 17, California

Sentinel Glass Compa

Stemmerich Supply Inc. St. Louis 2, Missouri

Mooney Bros. Corp. Lodi, New Jersey

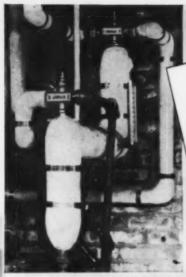
Will Corporation Rochester 3, New York

Fisher Scientific Compa Pittsburgh 19, Pennsylvani

CORNING	GLASS	WORKS,	Dept. CE-2,	Carning,	N.Y.

Please send me the printed information checked below.

- "PYREX brand Glass Pipe in the Process Industries" (EA-1)
- "FYREX brand "Double-Tough" Glass Pipe and Fittings" (EA-3)
- Gasket Materials for PYREX Pipe" (IA-13)
- "Plant Equipment Glassware for Process Industries" (EB-1)
- "Installation Manual for PYREX brand Glass Pipe"



Sorco makes simple, self-acting temperature controls assuring the desired Jacket cooling effect with minimum water consumption regardless of load variations.



Serco type TR-40-L Cooling Control-Jacket water temperatures never too hot or too cold.



Serce type FA Drain Traps have four pressure ranges to 750 psl. Sizes: %" or 1".



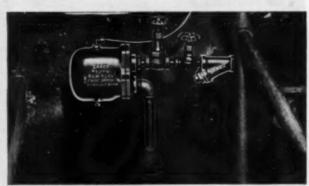
The true measure of effective air compressor capacity is the useful work done by your compressed air.

Measured by this yardstick, many compressor installations are very much oversize for the work they do.

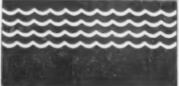
Apart from poorly designed piping, the trouble usually lies in wet air, overcooling, undercooling, choked intake filters, etc. All of these things add up to expensive compressed air and high maintenance costs.

New Technical Bulletin, No. 5-CA, is designed to help users and would-be users of compressed air to get more work from their machines at less cost.

Write for your free copy today.



Sorco type FA compressed air trap automatically removes separated water from the battom of the receiver. This greatly reduces the possibility of water being carried down the distribution lines to cause trouble in the tools or at the oir nozzles. This trap is also used to drain water from separators and the low points of distribution lines.



SARCO COMPANY, INC.

Represented in Principal Cities SARCO CANADA LTD., TORONTO S, ONTARIO

U.S.I. CHEMICAL

A Monthly Series for Chemists and Executives of the Solvents and Chemical Consuming Industries *

Methionine Found To Increase Rate Of Wound Healing

Striking evidence of methionine's value in helping to increase the rate of healing of wounds is found in a recent report of research in the field of protein nutrition. Groups of rats on controlled experimental diets were rats on controlled experimental diets were given the same type of wound, and the tensile strength of the healing tissues was measured at regular intervals. Animals on a methionine-supplemented diet showed the fastest rate of healing of all the groups tested. Up to now, wound healing was thought to

be related to protein nitrogen intake. This report indicates that methionine may be the limiting factor and concludes that methionine increases the efficiency of either dietary protein, tissue protein, or both. Data obtained in the tests showed that wounded tissues require a larger proportion of sulfur to nitrogen than they do under normal conditions. With methionine in the diet, the ratio of sulfur to nitrogen increases, and this may be what causes an increase in the rate at which wounds

U.S.I. was the first large-scale producer of Dt-methionine, an essential sulfur amino acid which finds wide application in the pharma-ceutical field and is also used as a supplement in animal feed

New Bonding Technique For Acrylic Plastics

A new method for cementing acrylic plas tics is reported to involve the use of a strippable coating instead of masking tapes as protection against excess cement. Described bright red, fast-setting, and easy to apply, the coating is claimed to be of particular value coating is claumed to be of particular value when used on irregularly shaped articles where tapes are cumbersome and difficult to apply and remove. Surfaces to be protected are dipped in or painted with the coating, which is not attacked by cements commonly used with acrylics. Pieces can be moved or stored two or three minutes after coating. During bonding, any cement squeezed out of the joint can be scraped, while still wet, onto the dry coating. The coating, along with the excess cement, can then be removed by peeling it off in one piece. The underneath surface is not attacked by the cement, and no adhesive gums are left behind, it is said.

New Synthetic Lubricant

An aliphatic diester, similar to those used in the manufacture of some plastics, is said to be the base of a new synthetic lubricant, tailor-made for turbo-jet and turbo-prop air-craft engines. The new oil will withstand operating temperatures ranging from minus 65° to plus 500° F. At the lower temperature, it is claimed to be about one-third as viscous as the best petroleum-base product, and at the upper temperature it is one-twentieth as vola-tile. In addition to the diester, it has been revealed that the lubricant contains pheno-thiazine to inhibit oxidation at high temperatures and tricresyl phosphate which helps to prevent gear wear. The oil is not intended for reciprocating engines, and it is not expected to replace petroleum products except where military applications require its properties.

U.S.I. Adds Propionic Acid To Industrial Chemicals Line

Hydrocarbon Synthesis Yields Versatile Chemical With Growing Applications-U.S.I. to Be Large-Scale Supplier

U.S.I. is further diversifying its service to users of chemical raw materials by becoming a large-scale commercial source of propionic acid. Third in the series of aliphatic acids, propionic acid is one of a number of materials being produced

High-Melting Metal Parts Fabricated by Spraying

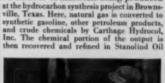
A new technique for fabricating large, com-A new tecnnique for tarricating large, com-plex parts of high melting point metals has been developed as a by-product of research into the nature of the metal spraying process, according to a report recently made public. In the course of uncovering the exact process by which a sprayed-metal deposit is built up, scientists evolved a method for forming high melting point metal parts by first spraying the metal onto a core of the desired shape, the metat onto a core of the desired shape, then sintering the sprayed deposit to form a dense, strong metal part. This new technique is expected to provide a simple, inexpensive means for obtaining the large complex metal shapes that are difficult to fabricate by conventional powder metallurgy, precision casting, or die forging. High melting point alloys as well a elementary metals can be formed. well as elementary metals can be formed by the new process, it is said.

Alloxan Seen as Possible **Cause of Human Diabetes**

Alloxan, a chemical closely related to vitamin C, may be the cause of diabetes in humans, according to a theory based on re-search in which the chemical induced dia-betes in animals. It was shown that alloxan betes in animats. It was shown that aircoan causes convulsions, excess sugar in the blood, permanent diabetes, and even death when injected into animals. It is now thought that the chemical can be formed in the human body under certain conditions, and that though it is easily decomposed, it could be retained in the body in a toxic form long enough to do harm. In a report of the work, it was pointed out that much more investigation will be needed before this theory can be accepted as an explanation for the cause of diabetes.

Metallic Vapor-Deposition Summarized in New Report

A recent report summarizes the available literature on formation of refractory coatings by vapor-deposition methods. Previously un-published research is also included on a new process for plating high purity coatings of temperature-resistant metals and the borides, silicides, carbides, and nitrides of these metals.





Normal-propyl ester of propionic atid is a good medium evaporating solvent for nitrocallulose and should find wide use in lacquers.

and Gas Company's plant. In U.S.I.'s facili-ties, these products are prepared for the mar-ket or for further synthesis at other U.S.I. installations

Propionic acid is a colorless liquid with pungent odor similar to that of acetic acid. It is separated from the water-soluble stream of the hydrocarbon synthesis and purified to meet rigid quality specifica-tions. Some of its established

MORE uses include preparation of

Explosions Snuffed Out Just Before They Happen With New-Type Bomb

The best way to prevent an explosion is to blow it up before it can start, according to the inventors of a device designed to snuff out explosions in gas tanks of war planes. The invention is a bomb, about half the size of a grapefruit, which contains carbon tetrachloride. It is placed inside the tank, and when an explosion of gasoline tumes begins, it is de-tected by a highly sensitive diaphragm built in to the bomb. Within a few thousandths of a second, the bomb goes off, completely dampa second, the bound goes on, compressly damped ing the explosion with carbon tetrachloride. It is also thought that the bombs could be adapted for use in coal mines to detect po-tential underground blasts and damp them out before they can take place.

U.S.I. CHEMICAL NEWS

1952

CONTINUED

Propionic Acid

perfume ceters and artificial fruit flavors. Salts of propionic acid are fungicides, and sodium and calcium propionates are used in prepara tions for inhibiting mold in baked foods and for controlling skin fungi. The acid has been used in the production of cellulose plastics and in the preparation of solutions for electroplating nickel. Esters of propionic acid are good solvents for nitrocellulose. With the acid more readily available, new applications for other specialized esters as plasticizers can be expected.

Volcanic Heat May Solve **Future Power Problems**

Large-scale utilization of volcanic power may soon help to solve growing fuel problems, according to recently published observations of a geologist. Energy available from gas vents and hot-spring waters of volcanic regions is of fantastic proportions, he declares, and man now has sufficient knowledge to permit the tapping of this reserve.

Heat given off in volcanic eruptions comes from an extremely hot shell of material, far underground, which becomes liquid magma when pressures are reduced by the cracking of rocks above, or when temperatures rise through radioactive heating. The magma rioes wherever it finds an opening, and its contact with ground water produces steam - and often violent explosions. During most cruptions, gas pressures may range from 700 to 20,000 pounds per square inch. This power has already been out to use in Iceland for heating buildings and in Italy for generating electricity and for heating fields to raise unseasonal crops. Some of these wells furnish large amounts of chemieals, including boric acid, borax, ammonium carbonate, and carbon dioxide. Acidity of the vapors is one of the technical difficulties standing in the way of large-scale exploita-tion of this energy, it is said, but wider use is possible in the future.

New Alkaline Process Derusts Iron Allovs Faster, More Easily

Announcement was made recently of an alkaline derusting process for iron alloys which requires no acid and which can be used in the field with only the assistance of a portable generator. Absence of acid in the process is said to eliminate subsequent rusting, to prevent attack on the base metal, and to operate in a fraction of the time required for acid pickling. In one test, complete rust and scale removal is claimed to have been accomplished in two minutes as against 45 minutes for acid treatment. No heat is required in the process, and if protection of the object being derusted is desired, zinc can be incorporated in the bath to allow cleaning, pickling, and zinc plating in one tank. In operation, the metal parts are made the cathode in a bath of special derusting solution. Speed of derusting is dependent on current density, which can vary over a wide range. The process does not have to be watched closely, it is said, because long treatment does not result in any attack upon the metal.

Plastic Stops .45 Bullets At Ten-Yard Range

A new plastic tough enough to stop a .45 caliber revolver bullet at ten yards has been developed, according to a recent report. Described as an alkyd molding compound reinforced with fiber glass, the new material is claimed to have a higher impact strength and greater resistance to shattering than any other plastic. The compound is supplied already mixed, and it can be molded easily into various shapes by conventional methods with heat and pressure, the company states. In addition, the plastic is claimed to resist heat and to provide good electrical insulation. It is currently being studied for possible military uses including armor plate and projectile heads. Civilian uses are foreseen in refrigerators, washing machines, electronic devices, and automobile parts.

TECHNICAL DEVELOPMENTS

Information about manufacturers of these items may be obtained by writing U.S.I.

Excellent corresion-resistant bases for organic coatings are said to be obtained with a new phosphate compound which changes surfaces of steel, iron, zinc, and cadmium parts to is

A new synthetic wax duplicates Jupen wax in all its essential characteristics and is nell-emulsifying when melted and added to hot water, according to the manufacturer. (No. 776)

Colored and protective coatings for aluminum, including shades of brass and gold resembling solid metals, are said to be obtained with a new one-step immersion process applicable to almost all aluminum alloys.

A new heavy-duty vinyl electrical tape, claimed to be more than twice as thick as previous tapes, is available for underground use and for high-tension leads subject to abrasion and ro

Replacement of custor all in many industrial applications is reported possible with a new modified vegetable all which has the same viscosity, solubility, and non-drying characteristics.

New coments for acrylic plastics are described as monomer base bonding agents which set readily to produce strong, optically-clear bub-ble-free joints. (No. 774)

A new acid-alkali-resisting glass, intended for use in a pH range of 9 to 12, is expected to prove valuable in equipment for neutralisation and polymerization reactions.

Remarkable similarity to Carsauba is claimed for another new wax which is said to be useful in carbon paper, solvent polishes, and other wax-containing products.

Chicken feathers are converted to cloth and felt by a new process which yields a fiber with characteristics of both silk and wool, according

Hot gas welding guns for thermoplastics are available in gas heated or electrically heated types. Both operate with nitrogen or compressed air, and nossle temperatures can be varie 300° to 700° F., the company states.

PRODUCTS OF U. S. I.

ALCOHOLS.

Amyl Alcehel (Isoamyl Alcehel) Butanol (Normal-Butyl Alcehel) Fusel Oil—Refined Prepanel (Normal-Pregyl Alcehel)

Ethanol (Ethyl Alcohol)
Specialry Denatured—all regular
and anhydrous fermulas
Completely Denatured—all regular and annyarous termus are-190 preef U.S.P., Absolute-200 Preef

ANTI-FREEZE Super Pyro* Anti-Freeze U.S.I. Permanent Anti-Freeze STHERS

Ethyl Ether, U.S.P. Ethyl Ether, Absolute-A.C.S.

ACETONS - A.C.S.

ANSOLS

ACETIC ESTERS -Commercial Amy! Acetete--!

Sutyl Acetate
Ethyl Acetate—all grades
Normal-Propyl Acetate

OXALIC ESTERS Dibutyl Osalate PHTHALIC ESTERS

Diamyl Phthalate Dibutyl Phthalate Diethyl Phthalate OTNER ESTERS

Diethyl Carbonate Ethyl Chloroforma

RESINS (Synthetic and Natural)
Arochem*—modified types

Arochem®—medified types
Arodure®—ureo-formoldehyde resis
Aroflor®—for special flor finishes
Aroflor®—for temperature

curing phenolic
Areplaz*—elkyds end allied materials
Areplaz*—elkyds end allied materials
Arepol!—copolymer modified alkyds
Ester Gume—ell types
Natural Resins—ell standard grades

INSECTICIDE MATERIALS VSECTICIDE MATERIALS
CPR Concentration (Liquid & Dust
Ficeronyl Butouride
Piperonyl Cyclonene
Pyrenome* Concentrates: Liquid & Dust
Pyrenome* Concentrates: Liquid & Dust
Bolenome Products: Liquid & Dust
Bolenome Products: Liquid & Dust

INSECTIFUGE MATERIALS Indolone*
Triple-Mix Repellents

INTERMEDIATES

Acetoaceteniiide Acetoacet-ertho-chierooniiide Acetoacet-ortho-toluidide Acetoacet-para-chiorooniiide Ethyl Acetoacetore Ethyl Benzoylacetote Ethyl Sodium Oxalacetote

FEED PRODUCTS

Curboy & G°
pt. Methionine
Riboflovin Concentrates
Special Liquid Curboy*
U.S.I. Vitomin 812 and
An biotic Food Supp
Vocatene* 40

OTHER PRODUCTS

PIB*—Liquid Insulation Special Chemicals and Solvents Urethan, U.S.P. *Reg. U.S. Pat. Off. 1Trademark Pending

NDUSTRIAL CHEMICALS

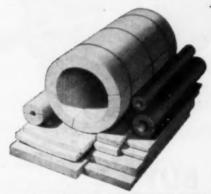
Division of National Distillers Products Corporation

60 EAST 42nd ST., NEW YORK 17, N. Y.

BRANCHES IN ALL PRINCIPAL CITIES

Does Your Present Heat Insulation Have All These Advantages?

Kaylo Heat Insulation is a hydrous calcium silicate — a revolutionary heat-saving material—outstanding both in performance and ease of application.



KAYLO PIPE INSULATION is made to Simplified Dimensional Standards of thicknesses and diameters for any nesting, when necessary.

- LOW "K" FACTOR—Billions of sub-microscopic air spaces which compose the structure of Kaylo Heat Insulation give it exceptional insulating value.
- TEMPERATURE RANGE UP TO 1200° F.

 --Kaylo Heat Insulation eliminates the need for combination coverings in nearly all operating conditions.
- 2 LONG SERVICE LIFE—Kaylo Heat Insulation remains dimensionally stable, strong and efficient over the years—although exposed to temperatures up to 1200°F.
- INSOLUBILITY IN WATER—Even when saturated, Kaylo Heat Insulation retains about 85% of its strength. It returns to its original strength after drying.
 - HIGH STRENGTH—Breakage of Kaylo Heat Insulation is almost negligible in shipping and installation—workmen can walk on insulated equipment without causing breakage.
 - 6 LIGHT WEIGHT—Since Kaylo Heat Insulation weighs only 11 pounds per cubic foot, it is exceptionally easy to handle and apply.
 - WIDE RANGE OF SIZES AND SHAPES

 -Kaylo Heat Insulation's unmatched selection of sizes and shapes reduces the number of pieces required per job.
 - EASE OF CUTTING AND FITTING—Ordinary tools of the trade are used to install Kaylo Heat Insulation. The material is non-irritating to the skin and non-toxic.

For complete details on all of the advantages of Kaylo Heat Insulation, write Dept. N-256, Owens-Illinois Glass Company, Kaylo Division, Toledo 1, Ohio.



KAYLO

. . first in calcium silicate

... pioneered by OWENS ILLINOIS Glass Company

MAIN OFFICE: TOLEDO 1, ONIO-KAYLO SALES OFFICES: ATLANTA . BOSTON . BUFFALO . CHICAGO . CINCINNATI . CLEVELAND DETROIT . HOUSTON . MINNEAPOLIS . NEW YORK . OKLAHOMA CITY . PHILADELPHIA . PITTSBURGH . ST. LOUIS . WASHINGTON Totally-Enclosed Fan-Cooled

Look Outside

Greatly increased radiating area means greater cooling efficiency. More important, cooling efficiency stays high, regardless of operating conditions. There are no enclosed external air passages to clog and cause overheating. If oily dirt sticks, just wipe or blow it off. No matter how bad operating conditions are, this motor can be easily kept clean and cool running. Electrical parts are protected against corrosive atmospheres by cast iron yokes and end housings.



Double-shielded, heavy-duty ball bearings require no maintenance in ordinary service under most conditions. However, they can be lubricated without disassembly if required. Double shielding prevents over-lubrication, leading cause of bearing trouble. Rotating seals, where shaft extends through housings, keep dirt and moisture out of bearing chambers. Die cast rotor and interphase insulation are further assurance of long life and low maintenance.



See why this is YOUR BEST MOTOR BUY

HERE IS A MOTOR that is different from conventional TEFC motors; built with an entirely different cooling system that gives you big savings in lower maintenance, more continuous service and less trouble in the toughest locations. Clogging can easily be prevented in the Allis-Chalmers Type APZ TEFC motor since areas that might collect dirt are exposed and easy to clean.

> GET DETAILS NOW — Ask your nearby Allis-Chalmers Authorized Distributor or District Office for more com-plete information on this high performance TEFC motor. Or write direct to Allis-Chalmers, Milwankee 1, Wisconsin. Ask for Bulletin 31B7225.

ALLIS-CHALM

Applied . . .



CONTROL — Menuel, magnetic and combina-tion starters, push but-



Here you see one of the cars specia designed to transport Phthalic Anhydride for The Barrett Division of Allied Chemical & Dye Corporation.

Barrett recently placed an order for an



Chemicals to coal oil...no matter what your product... move it with greater ease, assurance and economy with

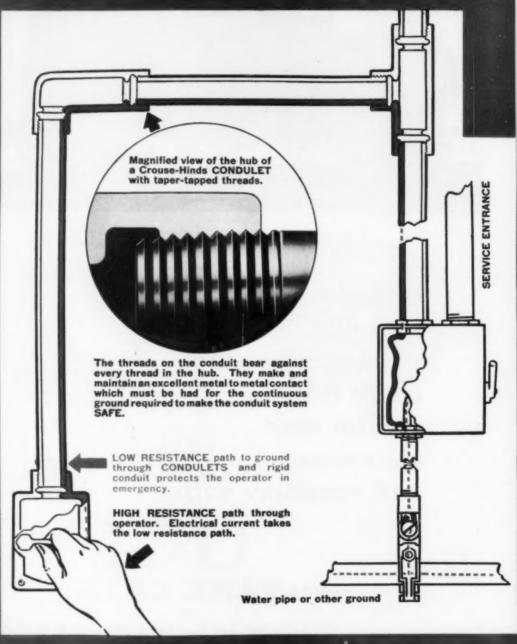
WHAT DO YOU HAVE TO MOVE?

Q.C.f. all-welded tank cars give you all the strength and economies of assembly line production, yet may be specially designed to transport any product. Operating records prove that these rugged Q.C.f. cars are safer to run...less costly to maintain.

No matter what your transportation problem, it's wise to check with Q.C.C. first. For complete information, write to: American Car and Foundry Company, 30 Church Street, New York, N. Y. Other Sales Offices: Chicago St. Louis . Cleveland . Washington Philadelphia · San Francisco

ALL-WELDED TANK CARS

CONDULETS* and rigid conduit



... the wiring method that gives you maximum

Typical CONDULETS



Type T Obround Condule



Type LR Obround Condulet



Type FS Condule



Type WMK Enclosed Safety Switch Condulet



Type VC Vaportight



Type EVA Explosion-Proof Industrial Lighting Fixture



Type GUAC Explosion-Proof Junction Condulet



Type EPC Explosion-Proof



Type GCH Groundulet Safety Circuit Equipment

SAFE for workers AND property

A low resistance grounding circuit is of vital importance in any electrical system. The combination of rigid conduit and CONDULETS provides the safest installation because this combination assures the permanence of the grounding circuit. In any grounding path, every joint that isn't tight in the beginning or loosens from vibration makes a high resistance point. Such high resistance creates a hazard for workers and can cause disastrous fires.

All rigid conduit has tapered threads and all CONDULETS (made only by Crouse-Hinds) have taper threaded hubs. This combination makes a secure joint that is tight in the beginning and stays tight. These joints will not loosen from vibration and assure a reliable and permanent low resistance path to ground. This SAFETY feature provides maximum protection against personal injury and fire.

Besides safety, a CONDULET installation gives you these additional definite advantages:

- MECHANICAL PROTECTION. Crouse-Hinds sturdy cast Feraloy CON-DULETS and rigid conduit provide the best possible protection against accidental damage to the wiring and equipment. Prevents costly shutdowns.
- FLEXIBILITY. To meet all the diverse requirements of modern electrical layouts, CONDULETS are made in a wide variety of shapes and sizes with varied hub arrangements, including a full line of CONDULETS with detachable hub plates.
- ECONOMY. The installed cost of Crouse-Hinds CONDULETS and rigid conduit compares favorably with other wiring methods. The added advantages make it the really economical method that pays dividends over the years.
- CORROSION RESISTING. Cast Feraley CONDULETS give the best protection wherever moisture, dust, or corrosive atmospheres are present.
- UNIVERSAL APPLICATION. You can install galvanized CONDULETS and galvanized rigid conduit under all atmospheric conditions and in all occupancies.
- QUALITY. The trademark CONDULET stands for the highest quality, reliability, and long life.
- VARIETY. More than 15,000 items are listed in the CONDULET Catalog, including
 a complete explosion-proof and dust-tight line for use in hazardous locations.

On YOUR next electrical layout, plan to get all the benefits of sturdy cast Feraloy CONDULETS and rigid conduit . . . the universal wiring method.

CONDULET is a coined word registered in the U.S. Patent Office. It designates a product mode only by the Crouse-Minds Company.

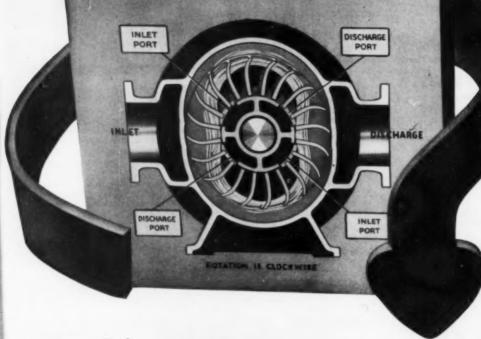
CROUSE-HINDS COMPANY Syracuse 1, N. Y.

CFTICE: Allesquesque-Romingham-Besten-Buffalo-Chicago-Channesti-Clerefinad Duline-Deurser-Datoid: Houston-Indianatella-Enseas City-Lie Angeles-Microckes Miller (1998) (19



CONDULETS · TRAFFIC SIGNALS · AIRPORT LIGHTING · FLOODLIGHTS

Nash Instrument Air Compressors deliver only clean air, free from oil or dust, and without filters



Here is Why!

You can dispense with oil filters and dust filters when you install *Nash* Clean Air Compressors. You can save the cost of maintaining these devices. You can greatly reduce instrument maintenance costs. For the Nash employs no internal lubrication, therefore no troublesome oil is in the delivered air. Moreover, air from a Nash is thoroughly washed and cooled as it passes thru the pump. Dust in the plant atmosphere, even fly ash, is immediately removed.

[®]Nash[®] Clean Air Compressors are simple, with only one moving element. No valves, gears, pistons, sliding vanes, or other enemies of long life and constant performance complicate a Nash. No aftercoolers are needed. You will find it profitable to investigate these pumps, now. No oil filters.

No dust filters.

No internal lubrication to contaminate air handled.

No internal wearing parts.

No valves, pistons, or vanes.

Non-pulsating pressure.

Original performance constant over a long pump life.

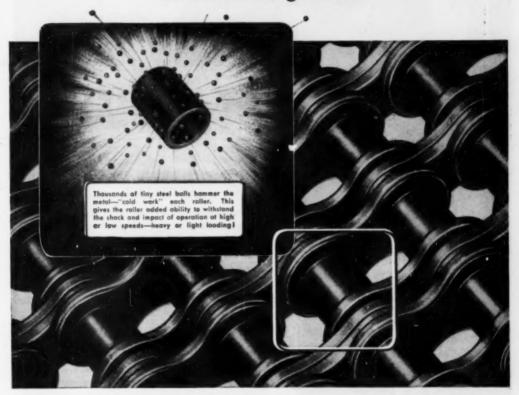
Low maintenance cost.

NASH ENGINEERING COMPANY
397 WILSON, SO. NORWALK, CONN.

Get the roller chain with rollers that are

SHOT PEENED

for EXTRA fatigue life!



You get this added feature in every LINK-BELT Roller Chain

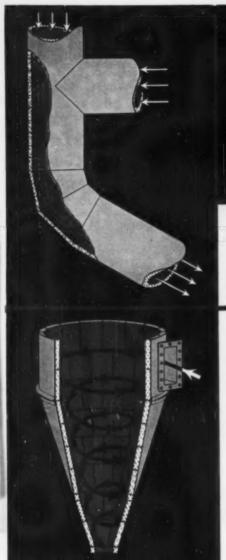
You get absolute uniformity, too. No highs. No lows. Just smooth, flowing dependable chains that pay off in wide flexibility—greater performance—longer life.

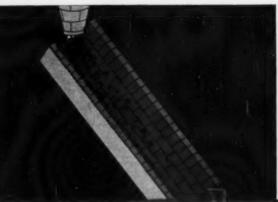
LINK-BELT Roller Chains are made from carefully selected materials with controlled heat treatment to assure uniformity and absence of weak members, then—rollers are shot peened to give them the extra fatigue life needed for today's higher speeds and heavier loads.

Link-Belt Roller Chain is available in single or multiple widths, in 36" to 3" pitch and double pitch. If you have a roller chain problem, see the LINK-BELT engineer nearest you.

LINK BELT

LINK-BELT COMPANY: Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Houston 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8, Springs (South Africa). Offices, Factory Branch Stores and Distributors in principal cities.





ABRASION

Used under the toughest abrasion conditions known; our CARBO-FRAX silicon carbide refractories or our MONOFRAX fused cast refractories have definitely outworn metals, paving bricks and other normally durable materials. For example:

In Cyclone Dust Collectors where the blast of millions of highly abrasive particles quickly cuts away other lining materials.

In Coke Chutes and Hoppers which must withstand punishing cascades of sharp-edged coke—sometimes fiery hot.

In Hot Blast Mains which carry high velocity gases that are laden with very abrasive dust.

In Billet Heating Furnaces where massive metal slabs are pushed or dragged across the furnace floor or other bearing surfaces.

Under conditions like these, regular lining materials or bearing surfaces are worn away in short order. Not so, these two Super Refractories. They last.

Granted, abrasion is seldom an isolated condition. It's usually abrasion plus . . . heat, or acid attack, or some other condition. But whatever the combination of conditions, chances are, there's a Super Refractory to fit the bill. For, as you can see (box, opposite page), these materials have many other properties equally as desirable in certain applications as abrasion resistance.

Super Refractories by

CARBORUNDUM

Refractories Division

Perth Amboy, N. J.

"Carborundum", "Carbofrax" and "Monofrax" are registered trademarks which indicate manufacture by The Carborundum Company.

SUPER REFRACTORIES ARE ALSO USED

WHERE HEAT CONDUCTIVITY IS NEEDED. At elevated temperatures CARBOFRAX refractories conduct heat almost as rapidly as chrome-nickel steels! This characteristic is invaluable in checkers, muffles, hearths, radiant heating tubes, etc. It often radically increases the capacity of the equipment. There are also Super Refractories which are very good insulators, particularly at high heats.

WHERE CHEMICAL ACTION IS PRESENT. In general, all Super Refractories are either neutral or acid in nature. They are widely used where chemical inertness is important.

WHERE STRENGTH IS IMPORTANT. No commercial tonnage refractories have greater strength than Super Refractories. All can withstand over 300 psi at 2750° F without crushing. The modulus of rupture of one composition averages 3100 psi at 2460° F.

WHERE HIGH HEAT IS INVOLVED. They can be safely used at temperatures over 3000° F. They are very durable-are highly resistant to spalling and cracking. Some varieties are almost indispensable where flame impingement or violent temperature changes are present.

that will cut through metal

hardly touches these materials

They're the toughest known materials for large scale commercial use—so tough, they'll quickly wear out the best grinding wheels.

Have you any spots in your equipment that are vulnerable to abrasion? Areas that need constant relining or replacing? Then don't fail to investigate our CARBOFRAX bricks and shapes, and our MONOFRAX K blocks. Both materials give "armor-plated" protection. Both are extremely hard-within one index point of diamond hardness!

Possessing properties seldom associated with refractories, these, and other Super Refractories by CARBORUNDUM, are often used regardless of whether high temperatures are involved. Great strength and durability plus high resistance to heat, corrosion and abrasion, make them ideal for a wide range of applications.

It's surprising how often you'll find places in your equipment where Super Refractories are inherently better-and less expensive-than other materials. They're well worth investigating, particularly in this period of scarce critical materials.

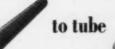
Why not check up? Practically all Super Refractories are available as bricks or special shapes molded to close tolerancesincluding fitted joints, tubes, etc. Send today for our booklet describing the properties of these unique materials.



Information is now available on all the various groups of Super Refractories by CARBORUNDUM. Just send the coupon for our new booklet. No obligations, of course.

Dept. H-22 Refractories Div., The Carborundum Co. Porth Amboy, New Jersey Please send your free booklet describing the principal properties of Super Refractories.

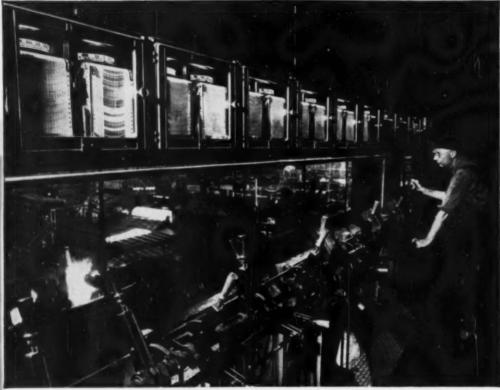
... from billet





to fitting





From this modern control room, every step in the heating, piercing, relling and reduction of seamless tubes is closely monitored. This is typical of the highly specialized equipment demanded by the Globe precision process . . . insuring high quality and close tolerances.

CLOBE

highly specialized process controls are used to produce the finest in WELDING FITTINGS



Globe precision-process manufacture begins with the billet — continues through the making of the seamless steel tube — (Globe alone among welding fitting manufacturers produces seamless steel tubes) — and extends through to the production of the finished fittings.

Because Globe has highly specialized controls at every stage of manufacture in its own plant — you can be sure of uniform high quality seamless welding fittings when you specify Globe.

GLOBE STEEL TUBES CO. MILWAUKEE 46, WISCONSIN

Chicage, Cleveland, Detrait, New York, Philadelphia, St. Louis, Denver, Houston, San Francisco, Glandale, Cal.

Producers of Globe seamless stainless steel tubes — Gloweld welded stainless steel tubes — alloy — carbon — seamless steel tubes — Globeiron (high purity ingot iron) seamless tubes — Globe Welding Firtings.

New Niagara Filter NIAGARA STYLE H* Pressure-Leaf Filter

Gives

MORE PRODUCTION WITH LESS LABOR

on filtrations involving high % of solids

Here at last is a clarifying filter with high solids capacity (up to 150 cu. ft. per unit) that gives you production rates 2 to 3 times as fast as conventional presses—plus quickest, easiest cake discharge ever known! One man, operating several Niagaras, can easily produce as much as three men on conventional presses!

CUTS CLEANING TIME TO MINUTES! Gives you far more productive filter time per day! One operator easily discharges up to 150 cu. ft. of filter cake, in minutes instead of hours. Cakes are discharged in semi-dry state, ready for disposal or recovery.

ENDS COSTLY CLOTH REPLACEMENT AND WASHING! Press cloths are completely eliminated with Niagara all-metal leaves, proved in use in Niagara vertical filters. You save every penny you now spend on cloth replacement—plus every minute now used to wash and handle press cloths!

Check these advantages—Flow rates to 1000 GPM per unit . . . Solids capacity to 150 cu. ft. per unit . . . All-welded, leak-proof construction—safe for handling volatile, flammable, explosive materials . . . Easily steam-jacketed . . . Excellent cake washing characteristics . . . Sharpest filtrate clarity . . . Interchangeable leaves.

FOR MORE FACTS-mail the coupon or write us today!

LEAVES ROLL OUT as a single unit, for quick easy cleaning. Monorail and windlass assembly are a permanent integral part of the filter. Windlass is hand operated, can be motorized on large filters.



CAKE DROPS OFF when leaves are tapped with rubber mallet. Air-blown cakes separate readily from the stainless steel leaves.



COVER LOCKS and unlocks with one fast, easy motion. A girl can operate the Niagara Q/O* cover. No hand-wheels, eyebolts, spokes or spiders.

Trade Mark Pat. Applied for.



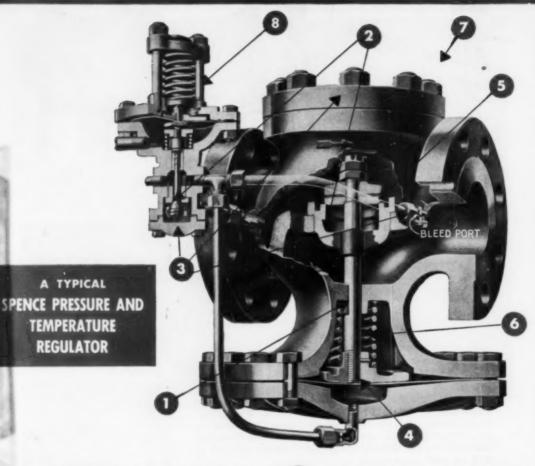
BY EUROPE-HIAGARA FILTERS EUROPE, 36 Leidzegracht, Amsterdam-C, Halland

HIAGARA FILTER CORP., 3687 Main St., Buffalo 14, N.Y.	
Please send me Bulletin H-1051 on the Style H Filter.	-
Name	. 1
Title	-
Company	-
Address	

City_



THESE SPENCE FEATURES Reduce



LESS DOWN-TIME of the system! Less time and money wasted on replacement of parts! Thousands of installations throughout the country have proved that Spence Self-Operated Regulators stay "on the line"... provide dependable, trouble-free pressure and temperature control. Users know these precision-engineered Spence units rarely need extensive repairs or special attention. Here are a few of the Spence design features that help keep maintenance at a minimum:

PACKLESS CONSTRUCTION—All Spence main valves and most pilots are built without stuffing boxes. This packless construction saves many maintenance man-hours because it climinates the need for closely fitted parts which may stick or bind due to uneven expansion or foreign matter.

EASY TO CLEAN—The seat and disc of the main valve and pilot can be cleaned and any working part removed without taking the main valve out of the line.

NO DISMANTLING FOR INSPECTION—Special openings are provided to inspect the main valve disc, the pilot valve member and the SECO Metal bleedport. Inspection is easier, too, because the pilot is not an integral part of the main valve. The pilot is protected by an accessible built-in strainer.

LONG-LIFE METAL DIAPHRAGMS—Spence metal diaphragms, under usual conditions, never require replacement. Spence Regulators have few moving parts and those few are ruggedly constructed and seldom require attention.

SPENCE PRESSURE and TEMPERATURE

Maintenance...Cut Costs

BUILT TO LAST FOR YEARS!

That's the reason Spence Self-Operated Regulators lower over-all costs. Dollar for dollar, you can count on quality performance for a longer period of time. Look at three of many Spence features that assure long regulator life:

DURABLE SECO METAL SEATS AND DISCS—Spence seats and discs are made of durable SECO Metal which resists wiredrawing. More than twenty years of experience with SECO Metal in thousands of installations has failed to produce a single case where SECO Metal has been cut by steam.

SPRING OUT OF PATH OF STEAM
—The spring in the Spence Regulator is out of the path of high-pressure
steam or other fluids flowing through the
valve. Since the spring operates at low
unit stress, it has exceptionally long life.

LESS FRICTION—All Spence Regulators are built with packless main valves which are actuated by large, balanced diaphragms. This design minimizes friction. Valves remain unaffected by

changes in service conditions or length of service.

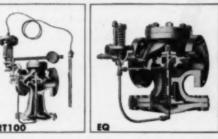
WHY SPENCE UNITS REGULATE ACCURATELY

8 YOU CAN BE SURE of accurate regulation because sensitive pressure or temperature pilots control the main valve of every Spence unit. This unique design enables the Spence Regulator to serve many functions and handle all the various types of fluids under a wide range of conditions.

One of the great advantages of this Spence design is the interchangeability of all pilots on all sizes of main valves. Any main valve can be changed from a pressure to a temperature regulator or vice versa simply by substituting one type of pilot for another.

WIDE RANGE OF SIZES

Spence Regulators are built in sizes from $V_4^{\prime\prime\prime}$ to $12^{\prime\prime\prime}$ for service with air, steam, water, oil or gas. With minor adjustments, any Spence Regulator can be easily switched from one service to another.



The Type EMD Pressure Regulator includes a SPENCE Solonoid Pilot to cut it on and off electrically • The Type E27100 Temporature Regulator in effect is a pressure regulator which is constantly roses by small variations in tem-

EMD

perature at the sensitive thermostet. • The Type EQ Back Pressure Reguleter is a self-approsted, packless unit which controls its own initial pressure. The general construction is the same as the Type ED Pressure Regulator.

FREE BULLETIN GIVES ALL THE FACTS

YOU WILL FIND complete engineering details and selection data on Spence Regulators in free bulletin No. 5000. It features a full color, fully illustrated description of the operating cycle of a Spence Regulator. Send for your copy of this valuable bulletin today.

SPENCE ENGINEERING COMPANY, INC. WALDEN, NEW YORK

PARTIAL LIST OF USERS

The Cleveland-Cliffs Iron Company

Tennessee Coal, Iron and Railroad Company

The Springs Cotton Mills

Ford Motor Company

Cochrane Corporation

Philadelphia Electric Company

Pennsylvania Power & Light Company

L. H. Gilmer Company Div. of United States Rubber Co.

York Corporation

Jones & Laughlin Steel Corporation

The Duluth Steam Corporation

Rochester Gas and Electric Corporation

Consolidated Gas Electric Light and Power Company of Baltimore

Phenix Natural Gas Company

Cutter Laboratories

National Tube Company

The Atlantic Refining Company

Great Lakes Steel Corporation

Union Electric Company of Missouri

Todd Shipyards Corporation

Oxford Miami Paper Company

Land O'Lakes Creameries, Inc.

Ohio Edison Company

General Electric Company

R. J. Reynolds Tobacco Company

Spence

REGULATORS





Duplex Receiver Duragauge—31/2" Dial Size. Peripheral pointer is red.

Compact panelboard design demands pressure gauges that combine extreme accuracy with smaller size, easy-to-read dials. The new Ashcroft Receiver Duragauges, with 3½" dial, meet those requirements exactly.

Wherever pneumatic transmission and control systems are used to indicate pressure, temperature or flow—in power plants, refineries, chemical plants—these new Receiver Duragauges provide accuracy within ½ of 1 percent of the dial range. Standard transmitted air pressure range is 3 to 15 P. S. I. Other ranges include 2 to 14, 2 to 15, 3 to 18 and 5 to 25 P. S. I.

Single and Duplex Receiver Duragauges are available. The Duplex incorporates two separate sets of Bourdon tubes, movements and pointers. Bourdon tube material is heat-treated phosphor bronze, extra wide for extreme sensitivity, with long tip travel for precision accuracy.

Get complete data, including dimensions and standard graduations. Your Ashcroft Distributor will gladly help you select the right Receiver Duragauges for your specific needs.

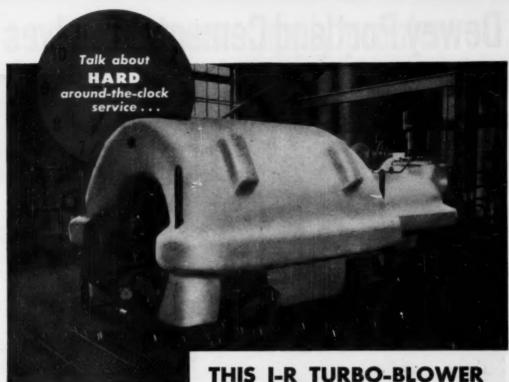


ASHCROFT GAUGES



A product of MANNING, MAXWELL & MOORE, INC. STRATFORD, CONNECTICUT

MAKERS OF 'ASHCROFT' GAUGES, 'HANCOCK' VALVES, 'CONSOLIDATED' SAFETY AND RELIEF VALVES, 'AMERICAN' INDUSTRIAL INSTRUMENTS. BUILDERS OF "SHAW-BOX" CRANES, 'BUDGIT' AND 'LOAD LIFTER' HOISTS AND OTHER LIFTING SPECIALTIES.



COMPRESSES 648°F FLUE GAS

at American Potash and Chemical Corp.

The Ingersoll-Rand Turbo-Blower at the Trona, California plant of American Potash and Chemical Corporation compresses 20,000 cfm of flue gas to 13 psig. Since the temperature of the gas, which is taken from the oil-burning boilers, is 648° F. at the blower discharge, the unit is heavily lagged. The blower and its 1265 hp turbine operate continuously 24 hours a day. There is no spare.

After being compressed the flue gas (13-14% carbon dioxide) is bubbled through carbonating towers containing brine from nearby Searles Lake. The precipitate formed is further processed by thickening, filtering, drying and calcining into soda ash.

In the process industries, and wherever large volumes of air or gas must be compressed to moderate pressures, over 3,000,000 horsepower of I-R Turbo-Blowers are repeatedly proving their economy and dependability in delivering oil-free and pulsation-free air or gas.

Ingersoll-Rand Turbo-Blowers are designed and built so as to guard against costly interruptions that could shut down your entire plant. For example, one I-R 11,000 hp Turbo-Blower was opened for inspection after six war-time years of continuous service. It was in good condition. While we don't approve of neglecting periodic inspection and maintenance, we are proud that the original low power consumption of this unit was not affected . . . that there was no costly maintenance . . . and that production was not interrupted.

I-R manufactures Turbo-Blowers in all sizes: to 20,000 hp, to 150,000 cfm, to 110 psig and higher.

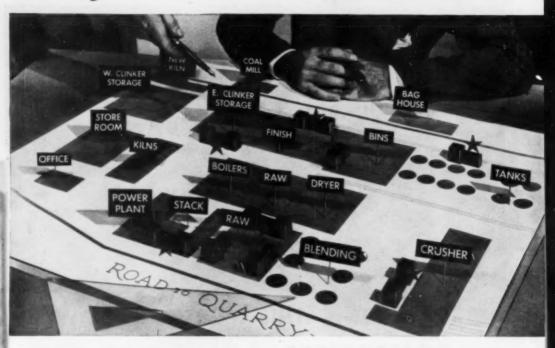
Therefore, whatever your blower application, Ingersoll-Rand can design and supply the Turbo-Blower that's right for the job—a blower you can depend on for constant delivery of air or gas at the lowest possible cost.



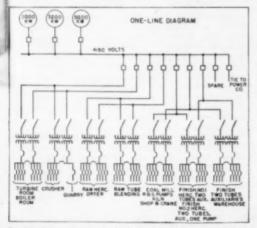
Ingersoll-Rand

COMPRESSORS - AIR TOOLS - ROCK DRILLS - TURBO-BLOWERS - CONDENSERS - CENTRIFUGAL PUMPS - DIESEL AND DAS ENGINES

Dewey Portland Cement Co. solves



Modernized System gives additional capacity



One-line diagram showing new load-center distribution system. Turbine-generators supply voltage at 4160 volts wye. High voltage is stepped down to utilization level 480Y/277-v right in the load areas. Two sources of power for each load-center unit assure the 24-hour-a-day service.

For 30 years, waste heat from the cement kilns has enabled the Dewey Portland Cement Company to generate most of its power. Additional power for peak loads and emergency conditions is supplied by a local utility.

Recently, increasing demands exceeded the capacity of the Company's two turbine generators, rated 3200 kw and 3000 kw, both at 480 volts. Since inadequate interrupting capacity of the switchgear equipments prevented further use of the local utility power, a critical problem developed.



LOAD CENTER

POWER DISTRIBUTION SYSTEMS

a critical power supply problem



Dauble-ended load-center unit rated at 3000 kva. Seven of these are located throughout the plant. Since all units are the same size, it was possible to standardize switches, transformers, and breakers.



Old switchboard with exposed switches and conductors threatened safety of plant and personnel. Old oil circuit breakers could not provide adequate interrupting capacity if hort circuit occurred.

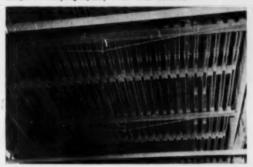
Load-center distribution key to power expansion

Called in by the Dewey Portland Cement Co., Dewey, Okla., G-E engineers found that an additional 5000 kw required by the plant could be supplied by a modern General Electric turbine generator, utilizing available waste heat.

G-E specialists recommended a generated voltage of 4160 wye. Existing 480-volt generators were rewound and load-center unit substations were used to step down the voltage to utilization levels right in each of the plant load areas.

High voltage distribution eliminated tremendous quantities of heavy low-voltage conductor. Voltage drop was reduced. Flexibility was increased because later increases in power demand can be met by the simple addition of more load-center units without altering the over-all system.

Here's a typical example of the way General Electric engineers are helping industry meet today's demands for more power. For further information, contact your G-E sales representative, or write for Bulletins GEA-5600—"Power for Industry's Third and Biggest Expansion" and GEA-3592—"Load-center Unit Substations." General Electric Co., Schenectady 5, N. Y.



 $14^{\prime\prime}$ x $6^{\prime\prime}$ bus previously needed to distribute power at 480 volts mode this roof a verticate "copper mine." With new high-voltage distribution, buses were eliminated.



New metal-clad switchgear has adequate interrupting capacity. All breakers are rated 4160 voits, 1200 amperes, 250,000 kvs. Completely metal enclosed, they provide greater protection for personnel.







consolidated engineering corporation

300 No. Sierra Madre Villa Pasadena 8, California Since 1949 Consolidated has operated this precision analytical service—utilizing mass spectrometry under the supervision of Consolidated's experienced staff. It serves research organizations and industry having analytical problems, but where the number of samples does not justify the purchase of an instrument. Sample requirements are very small. Recommended containers are 100 cc for gas and 5 cc for liquid. Where isotope ratios are required, samples must be in the vapor phase. Cost of the service is low. For further information, request Bulletin CEC-1813.

analytical service





Analytical Instruments for Science and Industry

You can't stop a bullet with a catcher's mitt





You can't stop corrosion with ordinary paints ...

it takes BITUMASTIC COATINGS!

CORROSION can't be stopped by ordinary paints or conventional protective coatings. They can't protect surfaces against the ravages of rust for any appreciable length of time.

But Bitumastic Coatings can!

BECAUSE the six Bitumastic® Protective Coatings, unlike maintenance paints, are specially formulated from a coal-tar pitch base* that is, for all practical purposes, impervious to water. And when you keep moisture away from an exposed surface, you stop corrosion.

BECAUSE Bitumastic Coatings provide an extra-tough, extra-thick barrier against corrosive elements—a barrier that is impenetrable.

BECAUSE Bitumastic Coatings provide up to 8 times the film thickness of conventional paint coatings.

BECAUSE Bitumastic Coatings stop corrosion caused by moisture—acid fumes—alkaline fumes—corrosive soil—salt air—heat.

There are 6 Koppers Coatings—formulated to control corrosion of metal and deterioration of concrete. Use the coupon for full information.

* Hi-Heat Gray contains heat-resistant metallic base.

-	SEND FOR SET OF FREE BOOKLETS!
	Koppers Compony, Inc. Tar Products Division Dept. 259-T, Pittsburgh 19, Pa.
	Please send me, without charge or obligation, your booklets on corresion prevention.
	Name
	Address
	CityZoneState



BITUMASTIC PROTECTIVE COATINGS

SOLD THROUGH INDUSTRIAL DISTRIBUTORS

KOPPERS COMPANY, INC., Tar Products Division, Dept. 259-T, Pittsburgh 19, Pa.

DISTRICT OFFICES: BOSTON, CHICAGO, LOS ANGELES, NEW YORK, PITTSBURGH, AND WOODWARD, ALA.

CHEMICAL ENGINEERING—February 1952



WHAT We, Your Warehouse,

- 1. Advise on N.P.A. requirements, Government regulations.
- 2. Help metal users solve priority problems and advise on delivery schedules.
- Help all users of Monel, Nickel, Inconel and other special alloys by giving practical advice on welding, machining, heat treating and other processing methods.
- Advise on special sizes and shapes in stock which are maintained complete as possible under critical conditions. By suggesting alternate sizes or materials, production can often be kept moving.
- 5. Help overloaded plant facilities with special services . . . such as cutting, shearing or sawing to size.
- 6. Mill orders. A close working knowledge of mill conditions enables us to handle mill orders with maximum efficiency. We . . . where possible . . . offer part shipment from warehouse stock.



MONEL® • "R"® MONEL • "K"® MONEL • "KR"® MONEL • "S"® MONEL NICKEL • LOW CARBON NICKEL • DURANICKEL® • INCONEL® INCONEL "X"® • INCOLOY® • NIMONICS

WAREHOUSE AND SERVICE CENTERS INCO NICKEL ALLOYS U. S., CANADA AND MEXICO

ATLANTA 3-J. M. Tuli Metal & Supply Co. 285 Marietta Street, Tel.: Alpine 3871 RALTIMORE 5 - Whitehead Metal Products Company, Int. 4300 E. Monument Street, Tel.: Eastern 3200 BUFFALO 7-Whitehoad Metal Products Company, Inc. 2128 Elmwood Avenue, Tel.: Bedford 2100 CAMERIDGE 39, MASS. - Whitehead Metal Products Co., Inc. 281 Albany Street, Tel.: Trowbridge 6-4680 CHICAGO 23—Steel Sales Corporation 3348 South Pulaski Road, Tel.: Bishop 7-7700 CINCINNATI 29-Williams and Company, Inc. 3231 Fredonia Avenue, Tel.: Capitol 3000 CLEVELAND 14-Williams and Company, Inc. 3700 Perkins Avenue, Tel.: Utah 1-5000 COLUMBUS 8, OHIO-Williams and Company, inc. 851 Williams Avenue, Tel.: Klondike 1623 DALLAS 9-Metal Goods Corporation 6211 Cedar Springs Road, Tel.: Elmhurst 3271 DENVER 2-Metal Goods Corporation 2425 Walnut Street, Tel.: Acoma 5891 DETROIT 10-Steel Scies Corporation 5151 Wesson Avenue, Tel.: Tyler 6-3000 EDMONTON, ALBERTA-Wilkinson Company, Ltd. 8411 103rd Street, Tel.: 35834 GRAND RAPIDS 2—Steel Sales Corporation 226 Federal Square Bldg., Tel.: Grand Rapids 9-3981 HARRISON, N. J.—Whitehead Metal Products Co., Inc. 1000 South 4th Street, Tel.: Humboldt 5-5900 HOUSTON 3-Metal Goods Corporation 711 Milby Street, Tel.: Central 8881 INDIANAPOLIS 2-Steel Seles Corporation 2059 North Illinois Street, Tel.: Talbot 1506 KANSAS CITY 8, MO.—Steel Sales Corporation 2201 Grand Avenue, Tel.: Victor 7270 LOS ANGELES 21-Pucific Metals Company, Ltd. 1400 South Alameda Street, Tel.: Prospect 0171 MEXICO, MEXICO, D. F.—Le Paleme Co. De Metales, S.A. Mesones No. 33, Apartado No. 7304 MILWAUKEE 9-Steel Sales Corporation 2400 West Cornell Street, Tel.: Hilltop 2-2020 MINNEAPOLIS 13-Steel Sales Corporation
401 Harding Street, N.E., Tel.: Sterling 4838 MONTREAL 1, QUE.—Robert W. Bartram, Limited 455 Craig Street West, Tel.: University 6-3711 NEW HAVEN 13-Whitehead Metal Products Co., Inc. 265 Church Street, Tel.: New Haven 8-0275 NEW ORLEANS 12-Metel Goods Corporation 432 Julia Street, Tel.; Canal 7373 NEW YORK 16-Whitehead Metal Products Co., Inc. 503 West 10th Street, Tel.: Watkins 4-1500 PHILADELPHIA 40—Whitehead Metal Products Co., Inc. 1955 Hunting Park Avenue, Tel.: Haldwin 9-2323 PITTSBURGH 33—Williams and Company, Inc. 901 Pennsylvania Avenue, Tel.: Cedar 1-8600 PORTLAND 12, ORE.—Eegle Metels Company 2336 North Randolph Avenue, Tel.: Tuxedo 5201 ST. LOUIS 19-Steel Sales Corporation 4565 McRee Avenue, Tel.: Grand 5255 SALT LAKE CITY 4-Pacific Metals Company, 1td. 1186 South Main Street, Tel.: Salt Lake City 8-3421 SAN DIEGO 1-Pacific Metals Company, Ltd. 1833 India Street, Tel.: Franklin 9-5826 SAN FRANCISCO 10-Perific Motels Compeny, 11d. 2100 Nineteenth Street, Tel.: Mission 7-1104 SEATTLE 4—Logic Metals Company 4755 First Avenue South, Tel.: Lander 9974 SPOKANE 8—Engle Mutals Company East 320 Trent Avenue, Tel.: Madison 2419 SYRACUSE 4-Whitehead Metal Products Comp 207 W. Taylor Street, Tel.: Syracuse 3-0158 TOLIDO 2-Williams and Company, Inc. 650 East Woodruff Avenue, Tel.: Adams 8101 TORONTO 5, ONT.-Alley Motel Seles, Limited 881 Bay Street, Tel.: Princess 2581 TULSA 3-Metal Goods Corporation 302 North Boston Street, Tel.: Tulan 4-1176 VANCOUVER, B. C.—Wilkinson Company, Ltd. 190 West Second Avenue, Tel.: Fairmount 6101

"How we may help you get the metal you need"



Maybe we can help you as we did this customer

"Monel sheet was required for a chemical unit. The customer assumed that Monel was not available though it was the metal that would do the job most satisfactorily.

"We, his warehouse, were able to advise him that a CMP rating could be secured for this particular application and the Monel could be had if he would take an extended mill delivery.

"Or, if he could give us a choice of alternate sizes and gauges, it might be available from our warehouse emergency stocks.

"He secured a rating, placed his order and in this case we were able to deliver the Monel sheet in time to meet his requirements."

And just what kind of help can these Warehouses give you? First, they are suppliers of metals...not only Inco Nickel Alloys but other metals as well. They know the availabilities and times needed for delivery.

These Warehouses maintain complete up-to-date information on Government orders and regulations — information that may save you time and trouble in getting the metals you need.

If you have a corrosion problem or require technical assistance on the fabrication or mechanical application of a metal or alloy, they will gladly help you. If they don't already have the necessary information they will get it from the engineering or research staffs at Inco.

WHAT YOU CAN DO:

- 1. Consult your Warehouse on availability of metals and alloys.
- 2. Order well in advance of your requirements. Deliveries take longer today.
- 3. Make certain that your orders carry the D.O. or C.M.P. ratings and in case of Dept. of Defense orders, include contract number.
- 4. Be sure also to give full and specific "end use" information as evidence of need for N.P.A. approval.
- 5. Indicate alternate choices on sizes and materials ... where possible. By so doing a satisfactory alternate often may be obtained more promptly.
- 6. Depend upon your Warehouse for as much service as possible. Use its existing facilities to eliminate operations in your plant or ask for names of experienced fabricators who can help you.
- 7. Don't hesitate to ask technical questions about selection, uses and working of Nickel, Monel, inconel and other critical metals. Often, suggestions can be offered which reduce shop spoilage . . . and save metal.

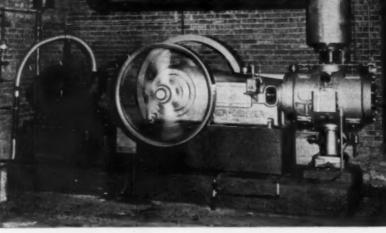
Very often your Metal Warehouse can help you overcome production difficulties with its on-the-spot knowledge of metals and availabilities. And frequently they can suggest substitute sizes, or in some cases name alternate materials.

All the companies listed here supply Inco Nickel Alloys. Just write to the one nearest you — or better still, pick up the phone and tell them your troubles.

THE INTERNATIONAL NICKEL COMPANY, INC. 67 Wall Street, New York 5, N. Y.



Unrestricted Flow



Gardner-Denver RX Single-Stage Compressors are made in a wide range of sizes to assure the right pressure and capacity for your needs.

... another reason why GARDNER-DENVER R X compressors save you money!

Free and easy! That's the way air flows through the large, unrestricted valve and port areas in the Gardner-Denver RX Compressor. That means the RX uses less power to supply the compressed air you need—and there you have one of the big reasons

why an RX costs less to operate.

Other money-saving RX features include the dust-tight, heavy-duty power end—automatic lubrication—and "Air-Cushioned" Duo-Plate valves. Write today for additional information.

SINCE 1859

GARDNER-DENVER

Gardner-Denver Company, Quincy, Illinois In Canada: Gardner-Denver Company (Canada), Ltd., Toronte, Ontario

THE QUALITY LEADER IN COMPRESSORS, PUMPS AND ROCK DRILLS

More Pollipops ... and better

because of ALCOA
Activated* Alumina

SUCCESSFUL candy manufacturers have discovered they can make more—and better—candy because of ALCOA Activated Alumina. This commercially pure, highly inert adsorbent eliminates costly moisture problems—sticky materials, gummed-up machinery, deteriorated products—by continually maintaining the low, even humidity required in processing, hardening and packaging rooms.

ALCOA Activated Alumina is a highly efficient and economical desiceant. With it, dew points as low as minus 100° F.—and even lower—can be maintained. Moreover, it will not swell, soften or disintegrate even when immersed in water . . . has high resistance to shock and abrasion . . . is non-toxic . . . non-corrosive . . . virtually iron-free.

Because of these outstanding properties, food, candy and drug manufacturers all over the country rely on ALCOA Activated Alumina to maintain their production regardless of the weather. Chemical, petroleum, air conditioning and oil maintenance men have found it equally effective in their businesses. Perhaps it can simplify your processes, speed up your production, improve the quality of your product. Let us tell you how.

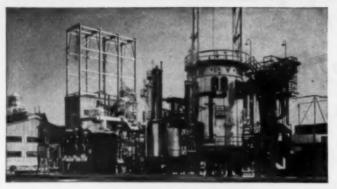
Write to: ALUMINUM COMPANY OF AMERICA, CHEMICALS DIVISION, 602B Gulf Building, Pittsburgh 19, Pennsylvania.

*Reg. T. M., Aluminum Co. of America



CHEMICAL ENGINEERING-February 1952

Life ... on the



south of the Border... New ammonia synthesis plant in Mexico represents another engineering achievement of the Chemical Construction Corporation, a Cyanamid subsidiary. Shown in the photo are the ammonia synthesis building, gas reformer and waste heat boiler, typical units of this specially designed installation. This is another example of the engineering skill that goes into fertilizer and heavy chemical plants built by Chemico in every part of the globe.



CHEWING THROUGH ROCK requires tough, sturdy equipment like this Ingersoll-Rand FM-3 Wagon Drill. To carburize and harden the yoke hoist worm of the drill, Ingersoll-Rand uses Cyanamid's AEROCASE\$ 510 and AEROCASE 28 Case Hardening Compounds. The worm gear (SAE 1020)—finish machined prior to salt bath treatment—is carburized at 1500° F for about one hour, then oil quenched, to secure a case depth

of more than 0.005". AEROCASE 510 is also used to help harden the "tailpiece" of the Ingersoll-Rand R-58 Stopehamer and acts as a cover for the lead bath. This three-way use is typical of the versatility of Cyanamid's family of metal treating compounds which includes: AEROCARB® Carburizing Compounds, AEROCASE Case Hardening Compounds and AEROHEAT® Heat Treating Compounds.

Chemical Newsfront

WHAT'S NEW... Calco NOBS* No. 1

Now delayed-action accelerator for natural, synthetic, and reclaimed rubbers. Produced by the Calco Chemical Division of Cyanamid, Calco NOBS No. 1 is ideal for use with reinforcing furnace blacks in modern tire compounding. No special handling required. Use the coupon for more information or a sample for evaluation purposes.

"Trade-mark



AN OLD ENEMY OF AIRPLANE PROTS—icing—can in many cases be controlled by de-icing equipment set in the leading edges of the wings. Important ingredient in compounding Neoprene when used in this equipment is magnesium oxide. Cyanamid's K&M Brand Magnesium Oxide is preferred by numerous manufacturers because of its reliable performance characteristics under a variety of compounding conditions.



CYANAMID CASEINS CONTRIBUTE TO COATED PAPER QUALITY by imparting a level "coat" which aids materially in giving sharp, clear reproductions free from spots, picks and other imperfections. Cyanamid also manufactures dependable specialty chemicals which give desirable properties to paper, such as wet strength, moisture resistance, better folding, improved pliability, reduced curl.

AMERICAN Cyanamid COMPANY

NOW...

SCREEN FINE, MOIST MATERIALS



Without Blinding!

NO "TIME OUT" to clear fine or medium mesh screen cloth! You can screen fine, moist non-combustible materials continuously with new Thermo-Deck heating unit.

INCREASED CAPACITY! Heated screen cloth remains open, permitting more tonnage through the screen and better separation.

LOWER COSTS! Operating records show that heated screen cloth lasts up to three times as long when cloth does not have to be pounded free of blinding material. The Thermo-Deck heating unit can be easily applied in the field. Your nearby A-C representative can give you more details. Allis-Chalmers, Milwaukee 1, Wisconsin.



POWER ON — Thermo-Deck heating unit keeps screen cloth clear on screen handling fine, moist



New 8-page bulletin containing complete facts on operation and application of the Thermo-Deck heating unit.

Bulletin 07B7812

#



POWER OFF — Troublesome blinding results on same screen when Thermo-Deck heating unit is turned off.

Therme-Duck is on Allia-Chalmers trademark

ALLIS-CHALMERS

Sules Offices in Principal Cities in the U.S.A. Distributors Throughout the World.













In Comban

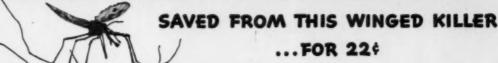
Gyretory Crush

Orlandon Mills

brating Screens K

Klins, Coolers, Dryers





This little fellow has twice the chance of reaching manhood since the Republic of Ceylon put through a DDT program against malaria mosquitoes. Here's a truly hopeful note from a harried world. Malaria is the world's most prevalent disease and kills three million people yearly, although its eradication is amazingly inexpensive. The DDT treatment in Ceylon cost only 22 cents per capita, yet it halved the death rate from all diseases.

One company in the United States alone turns out in one year enough DDT, among other pesticides, to rid several nations of malaria. This is the Kolker Chemical Works, Inc., recently acquired by DIAMOND ALKALI.

The whole United States spent for a full year's supply of pesticides (weed killers, plant hormones, as well as insecticides) only \$250,000,000; about the cost of 33 hours of World War II. What a profitable war people could wage saving lives—if they would—and how relatively cheap!





Chemicals you live by ... DIAMOND ALKALI COMPANY CLEVELAND, OHIO

SOBA ABM - CAUSTIC SODA - EMIDRINE & DERIVATIVES - SHEARROMATE OF SODA - BILICATES - EALSIUM SOMPOUNDS - EMBONE COMPOUNDS - ALSALI SPECIALTIES

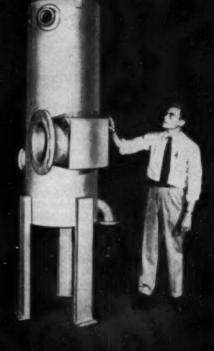
Pipe

AMPCO* ALUMINUM BRONZES

Conveyor Screws



Heat Exchangers



Centrifugal Separators





an answer to corrosion problems!

Boiler Code Approval

Ampco Metal Grade 8 is an annealed alpha aluminumbronze alloy conforming to ASTM B-169-50T Alloy D. It is approved for use in the construction of unfired pressure vessels. See your Boiler Code Handbook paragraphs U-68 and U-69 as interpreted in case No. 1108 - for complete details.



Tear out this coupon and mail today!

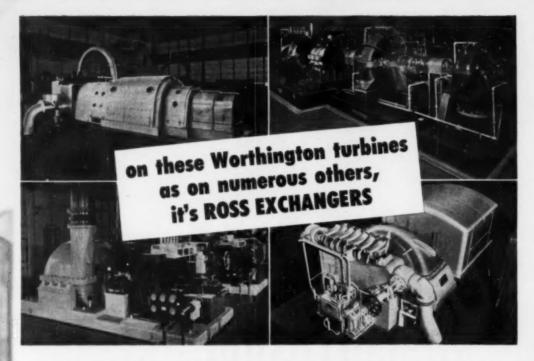
AMPCO METAL, INC., Dept. CE-2, Milwaukee 46, Wis.

Send me information on the application of Ampco Aluminum Bronzes for corrosion-resistant service in the Process Industries.

Name. .Title.

Company.

Company Address.



Top left: One of two Worthingten 1300 KW, non-condensing, automatic extraction type turbino generators supplying electric power for New Mealco gos company. Both equipped with Ross oil coolers.

Top right: 900 hp Worthington furbins-driven water works pump (complete with gear) operating le a Michigae municipality. Equipped with a Ross all cooler.

Lower left: Two 1140 hp Worthington condensing steem forbines driving cantrilingal blawers in Maw Jersey gas and electric utility. Both equipped with Ross oil colors.

Lower right: 5000 KW Worthington condensing type turbine penerator supplying power for Alichigan coment company. Equipped with Ross oil coeler. If you'd ask Worthington Pump and Machinery Corp. why it uses Ross lubricating oil coolers so extensively as factory-furnished accessories with its turbines, you would likely hear a number of reasons. For instance:

Standardization simplifies engineering . . . Wide selectivity of good materials makes them suitable for most conditions . . . Diversification of standard types covers numerous customers' requirements and specifications . . . Engineering data and details of construction are readily available . . . Prompt, dependable deliveries are assured.

But, they all boil down to one simple fact: Ross Exchangers are fully standardized.

Yes, Ross standardization makes a big difference to Worthington, just as it does to most other leaders in the turbine and diesel field. It's Ross standardization of design, of sizes, of component parts that makes selectivity and uniformity a certainty!

In Worthington's own words: "Competent Ross Engineers are available to study special problems and to make recommendations." Will you call us to work with you?



ROSS HEATER & MFG. CO., INC.

Document Annual Regions & Stanford Santings Convention

1411 WEST AVENUE BUFFALO 13, N. Y. In Canada, Harton Steel Works, Elmited, Fart Erie, Ont.

Serving home and industry



If highly corrosive fumes and atmospheres are making short work of conduits in your plant, investigate "Dekoron-coated" E.M.T. It stands up for years and years against

Salt-laden, moisture-saturated fumes in meat-packing plants . . .

Hydrogen sulfides and moisture in sewage disposal plants . . .

Acids and alkalies in chemical and processing plants . . .

A plastic armor is extruded over zinc-coated steel ELECTRUNITE E.M.T. to provide double-protection against your toughest atmosphere. The threadless-connections between lengths of E.M.T. are easily and completely protected by easy-to-apply electrical tape. It's real "end-to-end" protection of raceways against corrosion.

REPUBLIC STEEL CORPORATION

STEEL AND TUBES DIVISION 224 EAST 131st STREET . CLEVELAND 8, OHIO

WRITE TODAY ... for technical information on "Dekoron-Coated" E.M.T. ... it gives years of service where operating conditions are rough on raceways.

PLASTIC ARMOR

METAL TUBE



LIGHT WEIGHT THREADLESS RIGID STEEL RACEWAY

Announcing the New

LESLIE

DOUBLE SEATED DIAPHRAGM VALVES

- for use with CONTROL INSTRUMENTS

Offering these Important Features:

- ★ "FLOW-LINE" CONTOURED BODY—provides high capacity at low pressure drop.
- * STANDARD ISA FACE-TO-FACE DIMENSIONS
- * STELLITED SEATING SURFACES
- * RENEWABLE SELF-ALIGNING GUIDES
- ★ POWERFUL, COMPACT FRICTION-FREE DIAPHRAGM SUPERSTRUCTURE
- ★ THROUGH-BOLT CONSTRUCTION
 ON STEEL VALVES
- * WIDE RANGEABILITY
- ★ SEAT RINGS EASILY REPLACED WITH VALVE
 IN PIPELINE—not necessary to set up in a lathe
 or grind in at high temperature.

Available with various size superstructures. Sizes 1½" to 10" in Cast Steel and Cast Iron.



FLOATLESS LEVEL CONTROLS
SELF CLEANING STRAINERS

Look for LESLIE REGULATORS under Volves or Regulators in your classified telephon directory in the following cities where LESLIE factory trained engineers are located

Albany, N. Y.
Albanyanous, N. M.
Albanyanous, N. M.
Albanya, Go.
Burtimure, Mr.
Busineser, Taras
Birmingham, Alim,
Businese, Miss.
Birmingham, Alim,
Businese, Miss.
Birmingham, Comm.

Daties, Fears Server Core Der Moines, In Detail, Mohi Datath, Mohi Diseashar, N. C. Gorenstein, S. C. Gorenstein, S. C. Monstein, Newton Ringsport, Tenni, Los Angeles, Col-Los Ivillo, Ko. Memphis, Tenni, Mone Sporte, Fla Milwinken, Wil-Monagodin, Mon. Mohlor, Abr New York, N. Y. Orlando, Fla. Philosophia, Pa. Prindooph, Pa. Pomo Cre. Okto Portland, Ore. . Franciscore, R. L. Soff Lake City, Ung Sam Francisco, Col. Sanottio, Whash, St. Lawis, Mo. Systems, N. Y. Forsylows, N. Y. Forsylows, N. Y. Turson, Acta Wilmington, Col.I.

WRITE FOR

Class DV

279 Grant Avenue, Lyndhurst, New Jersey

PRESSURE REDUCING VALVES

PUMP GOVERNORS

AIR HORNS

PRESSURE CONTROLLERS
 TEMPERATURE REGULATORS

STEAM WHISTLES



$oldsymbol{\mathsf{H}}$ ELPING TO MAKE GOOD GASOLINE $oldsymbol{BETTER}$

The service offered by the Badger Process Division has for many years been a significant factor in the growth and advance of the American and International petroleum industry. Some of the clients who have employed us are represented by these famous trademarks.



Today, augmented by increased facilities and combined personnel, Badger Process Division stands ready to assist the petroleum industry to meet the challenge of the future by the competent design and installation of all types of processing units and complete plants.

STONE & WEBSTER ENGINEERING CORPORATION BADGER PROCESS DIVISION

AFFILIATED WITH E. B. BADGER & SONS (GREAT BRITAIN) LTD.



Reclaim Valuable Dust

Ask him to tell you about the benefits of Valuable Dust Recovery in your plant

Most probably you know of the benefits you obtain from the recovery or collection of industrial escape-dust: new profits, improved product and/or process, a boost in employee morale, more favorable plant community relations.

But-unless your dust collecting system is designed to the individual requirements of your plant, much of these benefits stand to go up the stack.

As a result, a Buell Engineer is a good man to know. Buell's staff of industrial 'dust' men draw on more than 200 man-years of experience in the design and construction of high-efficiency, trouble-free Dust Collection Systems. They can discuss the success of hundreds of Buell Installations, and how one can be designed for you.



For full information about the *three basic systems* of efficient Dust Collection and Dust Recovery write today. Ask for the new illustrated Buell 'Dust Recovery' bulletin. It can be a highly profitable move. Buell Engineering Company, Dept. 12-B, 70 Pine Street, New York 5, N. Y.



'SF' Mist Precipitator boosts efficiency in the collection of pyrite from gas in roaster furnace.





ENGINEERED EFFICIENCY IN DUST RECOVERY

HIGH EFFICIENCY CYCLONES * ELECTRIC PRECIPITATOR:
TYPE 'LR' COLLECTORS * LOW DRAFT LOSS COLLECTORS
SPECIAL PURPOSE COLLECTORS * DUST HOPPER VALVE

Send for your copy today!

Handling Metallic Sodium DESCRIBES PRESENT PLANT PRACTICES

IN HANDLING METALLIC SODIUM

National Distillers

This new illustrated booklet, just off the press, discusses the safe handling of metallic sodium from 1 lb. bricks to 80,000 lb. tank cars.

Whether you are concerned merely with commercial sodium specifications or with methods of shipping and handling, you will find it in this easy-to-read 24-page booklet.

For your copy, please address Dept. B, National Distillers Chemical Co., Ashtabula, Ohio.

DIVISION OF NATIONAL DISTILLERS PRODUCTS CORPORATION

PUTTING IT ON THE LINE...

in Industry after Industry!

The Grinnell-Saunders
Diaphragm Valve

Here's why ... Piping in today's complex industrial plants is an exacting science involving the handling of highly corrosive fluids, gases, compressed air, beverages, foods and suspended solids ... in lines where corrosion, abrasion, contamination, clogging, leakage and maintenance are costly factors. Under such conditions, the armazing adaptability of the Grinnell-Saunders Diaphragm Valve explains its acceptance by industry after industry.

Bodies of this versatile valve are made in a variety of metals—iron, stainless steel, bronze, aluminum and others. But of more importance is the fact that a body of cast iron (a metal not in short supply) can be lined with glass, lead, natural rubber, neoprene and other materials which, in many instances, handle corrosive fluids better than metals.

Diaphragms come in natural rubber, neoprene, butyl, hycar, a special synthetic for foods, and KEL-F. This last is chemically inert to all acids and alkalies in all concentrations with the exception of molten alkali metals.

From this broad selection of materials, the problems which the Grinnell-Saunders valve can solve are extremely varied. No wonder industry after industry is putting it on the line.



PULP AND PARIS MILL. Rubber-lined Grinnell-Saunders Valves on stainless steel piping handle sulphete pulp stock in bleach plant of Potlatch Forests, Inc., Lewiston, Jaho.



Showing rising spindle . . . valves are available with rising or stationary spindle.



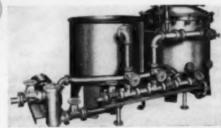
KEL-F diaphragm, using special rubber backing cushion and floating tube not design.



CHEMICAL PLANTS. Glass-lined Grinnell-Saunders Diaphragm Valves, with KELF diaphragms, handle chlarinated organic chemicals at Hooker Electrochemical Company, Niagara Falls, N.

CHECK THESE GRINNELL-SAUNDERS FEATURES ...

- Diaphragm absolutely isolates werking parts from the fluid.
- Diaphragm lifts high for streamline flow in either direction.
- Diaphragm presses tight for positive clasure.
- Body, lining and diaphragm materials to suit service.
- Simple maintenance diaphragm easily replaced.



EQUIPMENT MANUFACTURERS. Grinnell-Saunders valves with rubber linings are standard on filtration equipment for solution clarification, made by Industrial Filter & Pump Mig. Co., Chicago, Ill.

GRINNELL WHENEVER PIPING IS INVOLVED

Grinnell Company Inc., Providence, Rhode Island .

Sales Offices and Warehouses in Principal Cities



pipe and tube fittings * welding fittings * engineered pipe hangers and supports * Thermalier unit heaters * valves
Grinnell-Saunders diaphragen valves * pipe * prefabricated piping * plumbing and heating specialties * water works supplies
industrial supplies * Grinnell automatic sprinkler fire protection systems * Amca air conditioning systems



assembly of light rods, supports and disc mounts

The quarter plates and analyzer polarizer plates are easily removed. The instrument is very convenient to use, being simpler than an optical bench, It is only 36 inches long, 14% inches wide and 16) inches high, and permits horizontal and vertical adjust

ments over wide ranges. Type 1534-A Polariscope (for incomdex (nefuded): \$450.00

Type 1532-B Strobolume (40-microsecond







GENERAL RADIO Company



PROPYLENE GLYCOL, U.S.P., made by The Dow Chemical Company, is a product of consistent, high purity prepared specifically for tobacco, food, drug and cosmetic use. The fact that it meets the high standards required for inclusion in the United States Pharmacopoeia indicates its applicability to pharmaceutical preparations, as well as to foods and cosmetics.

To assist you in evaluating the functions of propylene glycol, U.S.P. in your product, Dow presents the following information on a number of practical uses for this highly efficient chemical. Despite current shortages, Dow continues to be interested in helping you solve your production and experimental problems.

THE DOW CHEMICAL COMPANY . MIDLAND, MICHIGAN

ADVANTAGES OF

- 1. Odorless
- 2. Relatively tasteless

PROPYLENE GLYCOL, U.S.P.

- 3. Low volatility
- 4. Acceptable in foods
- 5. Emulsifying aid
- 6. Wetting agent
- 7. Humectant
- 8. Preservative
- 9. Plasticizer
- 10. Excellent solvent

PROPERTIES and General Uses

An outstanding characteristic of propylene glycol, U.S.P. is its solubility in all proportions in water. Moreover, it will dissolve and put into water solution many organic chemicals. Thus, it is widely used in the preparation of foods, flavors, cosmetics and pharmaceuticals.

Propylene glycol is also an extremely effective softening and moistening agent, as indicated by the hygroscopic quality of water solutions containing large amounts of the chemical, plus its characteristic plasticizing action. As a moisture control agent, it is used in tobacco for cigarettes. Propylene glycol also inhibits mold growth. It is used to extend the shelf life of certain foods, as well as to prevent mold contamination of idle food machinery.

DOW PROPYLENE GLYCOL, U.S.P.

Conforms to or exceeds the specifications established by the U.S. Pharmacopoeia XIV (1950)

INTERPRETATION OF U.S. PHARMACOPOEIA SPECIFICATION

Specific Gravity @ 25/25°C	1.035-1.037
Distillation Range (Method 2 U.S.P. XIV) I.B.PD.P.	
Identification	
Ash	
Acidity (As Acetic Acid)	
Chloride	
Sulfate	
Heavy Metals.	
Arsenic (as As ₂ O ₂)	

*Method: Dilute 5 cc. of propylene glycol with 15 cc. of distilled water and add 3 drops of Hydrochloric Acid and 5 drops of Barlum Chloride T.S.

This is one of a series of Dow advertisements you may wish to keep on file for reference and information. Write Dow for reprints.

Propylene Glycol in FOODS



Because of its solvent, preservative, hygroscopic and wetting properties, and especially because of its economy in use, propylene glycol has found wide acceptance in the food field. Apparently, the only class of flavoring raw materials not sufficiently soluble in propylene glycol for the practical preparation of flavor solutions is the citrus oils. However, by using edible wetting agents, it is possible to prepare a 5% orange oil colloidal dispersion in propylene glycol which, to all appearances, will be a solution.

In addition to the preparation of flavor solutions, propylene glycol, U.S.P. is being used as a solvent for the extraction of vanilla flavor from vanilla beans and also in the preparation of a coffee flavor from ground roasted coffee. As a corollary to the flavors use of propylene glycol, many manufacturers have found that it makes an excellent food color solvent and that its use necessitates only very slight alterations in basic food color formulas.

Another interesting and relatively undeveloped use of propylene glycol is in increasing the effectiveness of shortening in the production of baked goods. Apparently the emulsifying or wetting action of the chemical aids in the dispersion of the shortening throughout the batch. Much investigation remains to be done on this phase of propylene glycol use, but it is apparent that a definite benefit can be obtained.

Being a hygroscopic material, propylene glycol in sufficient concentrations tends to attract moisture from the air and, as a result, baked goods, to which a very small proportion of propylene glycol has been added, have a considerably enhanced shelf life.

This preservative action, so apparent in the use of propylene glycol in baked goods, points logically to its use in other food products which require a preservative. Actual laboratory tests have shown that a 15% concentration of propylene glycol will inhibit the growth of mold on nutrient media, and it is quite possible that a smaller concentration would retard the growth of spoilage organisms under less ideal growing conditions. Although the subject has not been fully explored, there is reason to believe that many solid foods can be placed on the market in better condition through the use of small quantities of propylene glycol. The same qualities which make Dow propylene glycol,

U.S.P. useful in food and flavoring preparations can be of

PHARMACEUTICALS



great assistance in preparing pharmaceutical formulas. Here it acts as a carrier, solvent, emollient, humectant, lubricant and preservative.

The manufacturer of pharmaceutical preparations, whether for internal consumption, topical application or injection, must first solve the problem of finding a solvent which, in addition to being a good carrier, forms an acceptable medicinal. Propylene glycol, U.S.P. has been used in many approved pharmaceutical preparations and, in many cases, its preservative action is of considerable importance.

The versatility of the solvent properties of propylene glycol, U.S.P. applies to many organic chemicals used in the field of chemotherapy. Its use therefore should be considered in many estrogens, antiseptics, salves, elixirs, ointments and other types of pharmaceutical preparations.



COSMETICS

Dow propylene glycol, U.S.P. is used as a carrier, emollient, humectant, and preservative in many types of cosmetics. A great number of manufacturers of creams, lotions and similar products have discovered the advantages of propylene glycol's soothing and softening effect without residual stickiness. Propylene glycol can often be used in place of a more expensive ingredient and often will yield a superior product. In many cases, the addition of propylene glycol requires only a very slight change in the old formula to provide a high quality cosmetic.

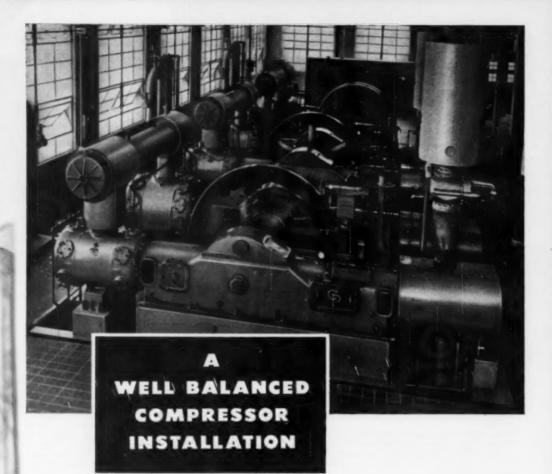
Propylene glycol has been found effective in the preparation of lotions (whether non-alcoholic, mildly alcoholic or strongly alcoholic), cold creams and "all purpose" creams, hormone creams, vanishing creams, practically every type of facial make-up, permanent waving solutions and wave set solutions, shaving creams, soaps, shampoos and sun tan preparations.

This material is presented for what assistance it may give and is merely to be taken as indicative of the characteristics of DOW propylene glycol, U.S.P. and is not to be construed as specific recommendations.

WRITE DOW FOR INFORMATION AND TECHNICAL ASSISTANCE.

total .	orints of this advertisement. nal literature about propylene glycal, U.S.F
Name	Title
Сотралу	
Address	
City	State





This CP installation in one of the country's largest automobile plants — three 500 horsepower compressors, one motor-driven and two steam-driven — is a good example of effecting heat balance.

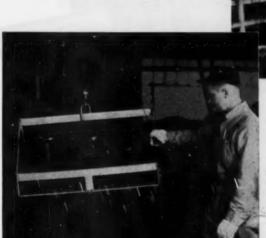
Such combinations of steam and motor-driven compressors provide a desirable flexibility of operation and reduce power costs particularly in plants where exhaust steam can be utilized for process work or for heating.



PNEUMATIC TOOLS . AIR COMPRESSORS . ELECTRIC TOOLS . DIESEL EMGINES ROCK DRILLS . HYDRAULIC TOOLS . VACUUM PUMPS . AVIATION ACCESSORIES

Write for complete information.

DON'T SCRAP DIRTY EQUIPMENT!



Same fittings after final rinse

USE VIRGO MOLTEN CLEANER ON:

Valves Pipe Fittings Pumps

Tanks Condensers

and hundreds of other salvageable items

QUICKLY REMOVES:

Grease Paint Dirt Rubber Enamel Atmospheric Corrosion Chemicals

Does not harm the metal!

Stact fittings before Virga Molten Cleaner Treatment

Clean it in 20 minutes or less with VIRGO® Molten Cleaner

You can salvage thousands of dollars' worth of used chemical equipment quickly and at low cost, with Virgo Molten Cleaner. It removes paint, dirt, rust and chemical impurities—gives you a clean surface in 10 to 15 minutes. No hand scraping, brushing, tumbling or sand-blasting are needed.

Virgo Molten Cleaner may be used on any metal not seriously affected by molten caustic. The process is simple and inexpensive. Here are its main steps:

- 1. Dip in Virgo Molten Cleaner Bath at 850° F-5 to 15 minutes.
- 2. Water quench.
- 3. Acid dip-2 to 3 minutes.
- 4. Water rinse.

For details, write us today on your business letterhead.

From the Salt of the Earth

5 FORTY-SEVENTH ST., NIAGARA FALLS, N. Y.
NEW YORK, N. Y. • WILMINGTON, CALIF. • TACOMA, WASH.



1.174

CHLORINE . CAUSTIC SODA . MURIATIC ACID . SULFUR CHLORIDES . VIRGO® DESCALING SALT . VIRGO® MOLTEN CLEANER



Bonderizing and 4 protective coatings ADD SERVICE LIFE

All exposed parts of the Life-Line chemical motor are Bonderized. We know of no other motor manufacturer who assures longer life in chemical service with this extra protection. After Bonderizing, a special formaldehyde-alkyd type enamel is applied; then two coats of Thermoset varnish; finally a coat of dark-gray lacquer. On-the-job performance proves this is the best type of motor for chemical service.

Longer Life... in chemical service" say these <u>life-Line</u> users

More and more plant operators confronted with the problem of operating motors for chemical processing are switching to Life-Line. They find that Life-Lines operate with less maintenance—AND have a greater life span. Here is an example:

Lubrication is a perpetual problem on a green liquor pumpat the Weyerhaeuser Timber Company. Various concentrations of caustic and lime dust, together with frequent water splashing turn grease and oil into a soapy substance—useless for lubrication purposes. This problem has been eliminated, as far as the motor is concerned, by the installation of a Life-Line motor. The Life-Line has sealed, pre-lubricated

bearings-keeps foreign matter out-needs no lubrication.

Proof of performance like this means your best buy for chemical motors is Life-Line. They are available in a complete range of enclosures . . . open—dripproof—splashproof—totally-enclosed fan-cooled—totally-enclosed non-ventilated. All have steel frames to effectively resist corrosion. All have sealed, pre-lubricated bearings that keep out destructive elements.

Cut down your motor replacement cycle with Life-Line. Your Westinghouse representative will show you how. Call him today or write to Westinghouse Flectric Corporation, P. O. Box 868, Pittsburgh 30, Pa.

J-21634



MMEDIATE DELIVERY

from NEW YORK,

CHICAGO.

KANSAS CITY,

NEW ORIENS.

DALLAS AND

LOS ANGRES

WAREHOUSES

Motors made by one of the largest manufacturers of electrical equipment on the continent... the 70-year old firm, Ateliers de Constructions Electriques de Charleroi of Belgium ... are now stocked—34 to 200 berspouer — in six U.S. cities, making it possible for American customers to receive immediate deliverius out of warehouse inventories.

Admissional strictly to NEMA PRAMES AND SPECIFICATIONS, ACEC motors for 3 phase current incorporate the electrical and mechanical excellence that only long experience and scientific research can produce. The ACEC of Belgium has long specialized in the complete equipment of power stations throughout the world. Quite natural, therefore, that ACEC motors enjoy world-wide recognition.

Branches and representatives of ACEC blenket 90 countries of the globe. Service in the United States alone is assilable from 232 DISTRIBUTORS AND SERVICE SHOPS. Write, wire or telephone

Integral Horsepower Electric Motors-% to 200 hp.

All ACEC Motors are **FULLY GUARANTEED**

the fellowing

- Open Drip Fruel Maters
- Style "C" Face Mounted Style "P" Vertical Solid Sheft
- ole Speed Schrope

Motors exceeding 200 hp. are built to order.



ELECTRIC SALES CORPORATION

One E. 53rd St., New York 22, N.Y. . Tel.: Plaza 8-3105

Lax Angeles + Dallas + Chicago + Kansas City Francisco + New Orleans + Pittsburgh + Louisville + Month Sevennah + Youngstown + Washington, D.C. + Puerto Rico

Sole representatives o ATELIERS DE CONSTRUCTIONS ELECTRIQUES de CHARLEROI



An example of good public relations restored by DOREX AIR RECOVERY

Here was a plant producing a popular and highly regarded brand of vitamins. Unfortunately, the sulphidic gases generated in their manufacture created a nuisance throughout the surrounding neighborhood.

Dorex Air Recovery, installed in the exhaust line of the ventilating systems, immediately removed the offending odor. Complaints ceased and good public relations were restored.

Abatement of exhaust gas nuisances is just one example of how Dorex Air Recovery is used by industry. It is also used to assure the freshness of intake air — often vital in delicate chemical processes — and to maintain air freshness in areas con-

ditioned for comfort.

Dorex Air Recovery "manufactures" fresh air by passing stale or odor-laden air through the ingenious Dorex C Cell arrangement of activated carbon. Thus, for recirculation, only about one-third the volume of outside air is needed. Result: less original investment in air conditioning or ventilating equipment, less operating cost. Specifically, the records of more than 10,000 Dorex users over the past twenty years show that every \$1 invested in Dorex Air Recovery should return a \$4 saving.

Let us show you the benefits of Dorex Air Recovery to your business. Just mail the coupon today.



W.B.CONNOR ENGINEERING CORP.

Danbury, Connecticut

Air Diffusion • Air Purification • Air Recovery In Canada: Douglas Engineering Co., Ltd., 190 Murray Street, Montreal 3, P. Q.

W. B.	CON	NOR	ENGI	NEERING	CORP.
Dept.	C-22,	Den	bury,	Connecti	cut

Please send me, without obligation, full information on Dorex Air Recovery.

Name Position

Compeny

ity Zene State

What's the biggest concentration headache

you've got?



Pass it along to us. We think we can help you lick it. Many industries have come to Carrier with problems

involving low temperature refrigeration. And together we worked out applications that improved both the process and the product. Often the process called for the evaporation of water from food products, or

of solvents from chemicals, where temperatures of process or product were critical. We bring this up to remind you that Carrier's experience in industrial refrigeration has been close and varied.

And, of course, Carrier's experience in the heat transfer business has paced the field for years. So it was natural for these combined skills to bring us into the evaporation and concentration business.

Carrier experts in refrigeration and heat transfer, together with engineers long experienced in evaporator design, developed the new Carrier Concentrators.

The Carrier Concentrator is a high vacuum, low temperature unit. It puts Carrier skill and experience to work in the concentration of products for the juice, milk and food

industries . . . the pharmaceutical, chemical and petroleum industries . . . along with many others.

Doesn't it make sense to bring your concentration problem to experts who have a solid background in evaporation





AIR CONDITIONING



and concentration both, as well as in other processes within your industry? We think it does.



Maybe you have an immediate problem the Carrier Concentrator can solve. Maybe you just want to find out how it fits into the job you're doing. Either way, why not write us?

THE CARRIER CONCENTRATOR is best because:

It gives you your choice of one, two or three effect evaporation together with either a centrifugal, reciprocating or an absorption refrigeration cycle — whichever combination best balances your investment and volume. Its low pressure construction and low film temperature cut operating costs and clean-up time, keep insurance rates and fabrication costs low.

Its packaged refrigeration cycle needs no refrigerant piping.

Its refrigeration cycle is separate from your evaporation plant: you can put it where it best fits in with the rest of your installation.

Where necessary, stainless steel is used on all parts in contact with the product.

You can sterilize the equipment either chemically or by steam, whichever your product may require.

And there are many other features which combine to give you the lowest possible first and operating costs plus the highest possible quality of product.

We'd like to send you additional information. Write us. Carrier Corporation, Syracuse 1, New York.

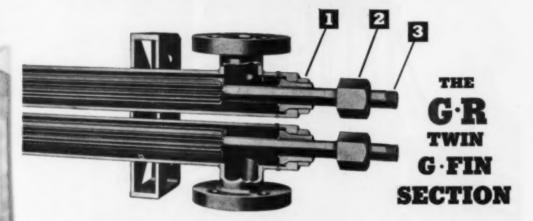
REFRIGERATION

INDUSTRIAL EQUIPMENT

ONLY 3 PARTS

To Assemble The Head End of This

FINNED TUBE HEAT EXCHANGER



1 A cone plug lock nut... 2 a union nut... and 3 a male tail piece... these are the only parts in the complete head end assembly of the G-R Twin G-Fin Section. There are no bolts or studs, no gaskets, no flanges, no rings, no fittings, no collars. This simple, exclusive design makes the heat transfer element easy to withdraw for inspection and cleaning.

You benefit by similar simplicity in every feature of the Twin G-Fin Section:

SIMPLE DESIGN—Consists essentially of a pipe within a pipe, without the complications of tube sheets, baffles and internal joints.

SIMPLE INSTALLATION—These lightweight, standard, interchangeable units can be easily stacked and connected in series or parallel for the desired capacity and temperature ranges.

SIMPLE MAINTENANCE — Removable return bends simplify cleaning of exteriors. There are no stuffing boxes to cause trouble, no rolled tube joints. Maintenance is low.

G-R Twin G-Fin Sections have finned tubes for greater

heat conductivity. These units—available in non-ferrous as well as ferrous alloys—can be used as heaters, coolers, condensers or heat exchangers for practically all liquids, vapors and gases. They can be readily converted from one service to another.

Bulletin 1614 describes Twin G-Fin Sections in detail.

Write for your copy today.

MORE WIDELY USED THAN ANY OTHER HEAT TRANSFER UNIT



In 17 Years more than 1000 firms have installed over 50.000 G-R TWIN G-FIN SECTIONS

The GRISCOM-RUSSELL CO., MASSILLON, OHIO

GRISCOM-RUSSELL

PICNEERS IN HEAT TRANSFER APPARATUS



MECHANIZE MATERIALS HANDLING



LIS:CHAL

blades and others may be interchanged in a few minutes

HD-SG THE MODERN TRACTOR IN EVERY WAY

owber lep. * 1 cu. yd. bucket

ALLIS-CHALMERS TRACTOR DIVISION

1127 South 70th St., Milwaukee 1, Wis

e send me literature on the Tracto-Shi

li	10	rei	nign	e f	rom	11	0 4	eu.	yd.				
Nome	****			*****		coton							
Title	iene	etucité			*****				901-004	*****	mx me	*****	
Campar	ıy	ure outling	********							**********			
Address					-	i Best						-	mediana
Address	-		-	-	-	a description		2000000	-			-	mediane

with simple tools,

General Electric Announces A NEW ADVANCE IN



Custom Performance from Standard Turbine Drives now possible through new Designs and Manufacturing Methods

Now you can select the mechanical-drive turbine that will give you maximum mechanical power for your fuel dollar . . . and without the delay and expense of special engineering. General Electric's four new multistage drives are standards, designed to meet your specific requirements.

Four new governing systems give you a wide selection of performance ratings. A new sectional valve gives you greater efficiency for part load operation. Many other improvements make these the finest turbines of their size General Electric has ever produced. Secret of their adaptability is in the method of manufacture. By using interchangeable casting patterns, designed to be combined in a variety of ways, it's possible for the factory to "customize" standard machines for individual applications. You get a better turbine, designed for your job, and the delivery time is shorter, the cost lower.

Get the full particulars on these new multi-stage turbine drives. Write for our new bulletin, GEA-5580, "G-E Multi-Stage Turbine Drives." General Electric Company, Section 252-53, Schenectady, N. Y.

GENERAL ELECTRIC

MULTI-STAGE TURBINE DRIVES

type DP

Dependable power over a 30 per cent adjustable speed range.

type DR

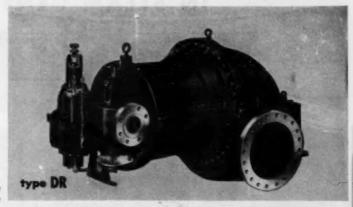
Oil-relay governor makes possible a speed range of 6 to 1, with only 4 per cent regulation and ½ per cent steady state speed variation.

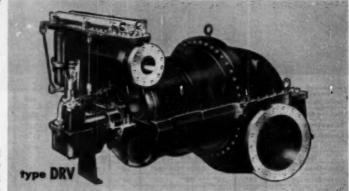
type DRV

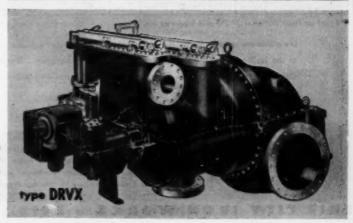
Automatic sectional valves linked to the oil-relay governor minimize throttling losses under fluctuating load factors, make possible substantial operating savings.

type DRVX

For applications where process steam is desired at a definite, steady pressure. Extracted steam pressure remains constant even when load on the unit fluctuates and the flow of extracted steam varies.







IMMEDIATE STEAM Introducing the Newest Idea IN STEAM GENERA Developed Boiler Horse Powe 75 100 150 200 250 300 350 400 450 500 600 800 Heating Surface Sq. Ft. 1250 357 500 750 1000 1500 1750 2000 2250 2500 3000 3500 4000 *Capacity Lb./Hr. 2490 3320 4980 6640 8290 9950 11,610 13,290 14,940 16,620 19,930 23,220 26,550 Overall Length - A 14'-10" 14'-10" 19'-4" 10'-6" 20'-0" 22'-0" 22'-0" 23'-0" 24'-8" 25'-0" 25'-6" 25'-6" Width - B 6'-3" 6'-6" 7'-1" 7'-8" 7'-8" 7'-8" 8'-9" 8'-9" 8'-9" 9'-0" 9'-8" 10'-3" 10'-3" Height - C 9'-5" 9'-915" 9'-915" 10'-3%" 10'-3% 10'-3% 11'-3%" 11'-314" 11'-3% 11'-314' 12'-7% 12'-74" 12'-11W **Upper Drum Dia** 34" 34" 34" 34" 34" 34" 34" 34" 34" 38" 38" 38" Lower Drum Dio. 24" 24" 24" 24" 24" 24" 24" 24" 24" 28" 28" Dig. Gas Outlet 100 12" 14" 16" 18" 22" 24" 26" 28" 30' 32 34"

*Based on Feed Water at 212°F and Steam at 100# psi.

22,000 25,000

27,000

20,000

Conservative ratings based on 5 sq. ft. per developed hp.

52,000 60,000 65,000 70,000

44,000

It's a 2-drum water tube boiler with integral water cooled furnace. Gases travel 3 lengths of the boiler—scrubbing 5 bare metal heat absorbing zones. It's complete—needs only service connections—burns oil or gas or both—requires no stack—no special foundation.

Write for booklet SB3BF.

28,000

COMPLETE STEAM POWER PLANT EQUIPMENT

33,000 36,000



Shipping Weight Lbs.

Complete Steam Generators • Type C 3-Drum Boilers • Types VL & VC 2-Drum Boilers • "Economic" Boiler with or without Water Walls • Welded H. R. T. Boilers • Welded Steel Heating Boilers • "Keystone" Packaged Steam Generators • Coal Pulverisers • Underloed and Spreader Stokers • Welded Pressure Vessels for the Process Industries.

ERIE CITY IRON WORKS . ERIE, PA. . Since 1840

BRANCH HEADQUARTERS*

in 54 Important Cities

ALBUQUERQUE, N. M. 610 N. 2nd St. ATLANTA, GA. 2475 Rivers Rd., N.W. BALTIMORE, MD. 11 E. 21st St.

BILLINGS, MONT. 2916 1/2 1st Ave., N. BIRMINGHAM, ALA. 544 American Life Bldg.

BOSTON, MASS. 31 Main St., Combridge, Mess. BUFFALO, N. Y. 817 Sycamore St. CHARLOTTE, N. C. 1726 Hutchinson Ave.

CHICAGO, ILL. 333 N. Michigan Ave. CINCINNATI, OHIO 626 Breadway CLEVELAND, OHIO 1501 Euclid Ave.

P. O. Box 1211

DAVENPORT, IOWA 918 Kahl Bldg. DENVER, COLO. 1526 Blake St. DES MOINES, IOWA 414 Tweltth St. DETROIT, MICH.

2842 W. Grand Bird. FLINT, MICH. 213 Mary St. HARTFORD, CONN.

W. Hortford HOUSTON, TEXAS 1309 Anita Ave. HUNTINGTON, W. VA. 916 Fifth Ave.

INDIANAPOLIS, IND. 5217 Hinesley JOHNSON CITY, TENN. 801 W. Walnut

KANSAS CITY, MO. 1529 Wyundotte KINGSPORT, TENN. P. O. Box 881 LOS ANGELES, CALIF. 406 S. Main St. MEMPHIS, TENN. Third and Medison Sts. MILWAUKEE, WIS.

5114 W. Center St. MINNEAPOLIS, MINN. 809 Pence Bldg. 965 Formington Ave., NASHVILLE, TENH. 106 % Second Ave., N. NEWARK, N. J. 972 Broad St. NEW ORLEANS, LA. 632 S. Peters St.

NEW YORK, N. Y. 500 Fifth Ave. OKLAHOMA CITY, OKLA. 1604 N.W. 5th St.

For Expert Help, Write or Phone the Clarage Sales Engineering Office Nearest You Church and Main Bidg.

PHILADELPHIA, PA 12 S. Twelfth St. PITTSBURGH, PA. 324 Fourth Ave. PORTLAND, ORE. 725 H.E. 25th Ave.

RICHMOND, VA. 1309 W. Main St. ROCHESTER, N. Y. 339 East Ave. ST. LOUIS, MO.

4485 Olive St. SALT LAKE CITY, UTAH 1551 Renondo Ave. SAN ANTONIO, TEXAS \$16 Insurance Bidg. SAN FRANCISCO, CALIF. EXPORT

414 Shoron Bldg. SEATTLE, WASH. 2615 Fifth Ave.

SYRACUSE, N. Y. 214 E. Fayelle St. TOLEDO, OHIO 660 Spitzer Bldg.

TULSA, OKLA. 1912 E. 6th St. WASHINGTON, D. C. 1426 G St., N.W.

WICHITA, KAN. 116 N. Rock Island

CANADA Canada Fens, Lid. 4285 Richelieu St. Montreal, Quebec

Ameresco, Inc. 50 Church St. New York, N. Y.

CAST IRON FANS from 200 to 3,000 C.F.M.

LARGE EXHAUSTERS

from 1,000 to 50,000 C.F.M.



Complete Air Conditioning Units



VENTILATING FANS from 200 to 200,000 C.F.M.

CLIP AND SAVE THIS AD Against the Time You Have a Problem in Our Field

Competent, resourceful help -in meeting your air handling and conditioning requirements -is close by and without obligation.

The Clarage application engineer nearest you knows his business. Like all Clarage representatives, he has been factory trained and has had wide field experience.

You can rely on his judgment. You can also rely on the Clarage HEAVY-DUTY equipment he recommends for your job.

Save this ad for his address. It will pay you to call him in the next time you have a problem in our specialized field.

YOU CAN RELY ON



MECHANICAL DRAFT to Meet Any **Operating Condition**

CERTIFIED

EADQUARTERS FOR AIR HANDLING & CONDITIONING EQUIPMENT CLARAGE FAN COMPANY-637 Porter St., Kalamazoo, Mich.

American Blower...a time-honored name in air handling



Oklahoma City has a conveniently located American Blower Branch Office to provide you with date and equipment for air handling. You can reach American Blower in Oklahoma City by calling 2-0695. In orther cities, consult your phone book.



HEATING LARGE AREAS

Ability to place heat where it's wanted and in the quantity needed is an advantage that makes American Blower Unit Heaters ideally suited for heating such large areas as warehouses, garages and auditoriums. These dependable unit heaters force heat down to the working level, heat up quickly with little time lag. They are low in first cost, and deliver more heat per pound of material than any other known system of heating. Models available for steam or hot-water heating systems, also self-contained gas-fired models.



DUST PROBLEM?

If you have a problem along the lines of dust and fly ash collection, American Blower will be glad to help you. We have a wealth of experience in this field that covers not only dust and fly ash removal in industry and public utilities, but also the recovery of valuable materials from air. In addition to local, on-the-spot assistance from our branch office personnel, a modern, fully equipped dust laboratory is maintained in Detroit to serve you.



MORE EFFICIENT POWER

If you're faced with the need of expanding or enlarging power plant facilities, consult American Blower. You'll find our Mechanical Draft Fans help you meet the most exacting power plant requirements. High static efficiency, low RPM, low tip speed and low inlet velocity are but a few of the many reasons these fans have enjoyed such wide acceptance. Types for both forced and induced draft work.

YOUR BUSINESS

No matter what business you're in, you can count on American Blower heating, cooling, drying, air conditioning or air handling equipment to do the job better, more economically. Phone or write our nearest branch office for data.

AMERICAN BLOWER CORPORATION, DETROIT 32, MICHIGAN CANADIAN SIROCCO COMPANY, LTD., WINDSOR, ONTARIO

Division of AMERICAN RADIATOR & Standard Sanitary correserves



Unit Heaters



Mechanical Draft Fans



Dust Collectors



Gýrol Fluid Drives



Industrial Fans

YOUR BEST

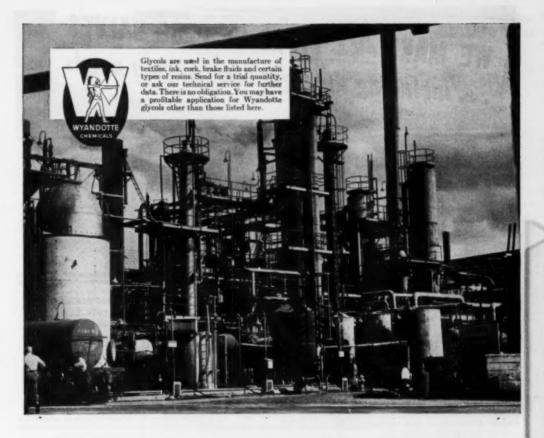
AMERICAN



RIOWER

AIR HANDLING

Serving home and industry: AMERICAN STANDARD - AMERICAN REPRES - ASME CARRETT - CHROCK STATS - BETRONT LIBROCATOR - ASWARD BOLLES - BOLS MATTE - TORROMANDA HOM



Let us work with you in finding how Wyandotte organics can help you

For example: how can the characteristics of Wyandotte glycols better serve your need for a solvent, refrigerant, plasticizer, or humectant?

Our glycols, for instance, have wide application throughout industry: DICOL*, a mixture of diglycols, as a solvent for dyes and resins; as a constituent in hydraulic fluids; as a plasticizer and as a humectant. Monocol* (mixed monoglycols) has the above applications and also serves as an antifreeze in automobiles, refrigeration, and air conditioning; and as a lubricant in frigid zones.

CHEMICAL ENGINEERING—February 1952

We'll gladly send you a trial quantity of either DICOL or MONOCOL.

Investigate now

Wyandotte's line of organic chemicals may easily hold a clue to the solution of a problem of yours. Our expanding facilities for production, research, and technical service qualify us, better than ever, to serve you as a dependable source of supply. Write us today for a booklet describing the fields in which Wyandotte organics—glycols, dichlorides, sodium CMC, alkylarylsulfonates, esters, and others—may be helpful. It contains informative data and is yours for the asking. Wyandotte Chemicals Corporation, Wyandotte, Michigan. Offices in Principal Cities.

*8EG. U.S. PAT. 00%,



WE MAKE <u>ALL</u> TYPES OF PLUG VALVES ... including the <u>right</u> one for your needs

HOMESTEAD CAM-SEALD



Straight-way... Flanged or Screw Ends



hree-way—Screw or Flunged Ends



Four-way—Flanged or Screw Ends

HOMESTEAD CAM-SEALD, QUARTER-TURN PLUG VALVES

PLUG VALVES
(mon-labricated, or pressure-gas
interiorised, or desired)

Available in metals for most valve needs; for pressures to 3,000 lbs.; temperatures to 750° F.

HOMESTEAD LEVER-SEALD



Straight-way— Flanged or Scraw Ends



Three-way—Flonged or Screw Ends



Four-way-Flonged or Screw End

HOMESTEAD LEVER-SEALD, QUARTER-TURN PLUG VALVES

(nen-latricated, or procove-gue labricated, as depired)

Made in combinations of metals and alloys to meet practically any service requirement; from 1½" to 10"; from vacuum to 1,500 pounds.

HOMESTEAD-REISER



Straight-way— Scraw or Flanged Ends



Straight-way— Worm & Goar Operated



Flow-Changer-Non-lubricated

HOMESTEAD-REISER SELF-SEALD LUBRICATED PLUG VALVES

(180 % Port Area, or Ventori, in Desiral)

Available in semi-steel; cast steel; sizes ½" to 12" for steam pressures to 150 lbs.; oil-water-gas to 200 pounds.

We are the only manufacturer who makes all of the various types of plug valves used in industry . . . LUBRICATED . . . NON-LUBRICATED . . . FULL PORT . . . VENTURI. We have no "leaders." We make them all; therefore, we have no reason to "push" one type valve over another. Our only concern is to see that you get the right valve for your requirement.

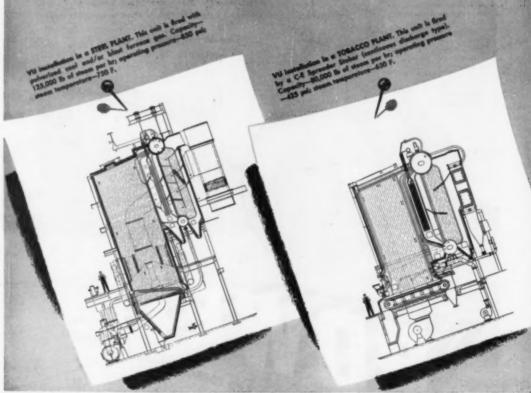
To help you keep this in mind the next time you need plug valves, we'd like to send you our catalog. Why not write for it today.

P. O. BOX 13 CORAOPOLIS, PA.

Souther Show 1084

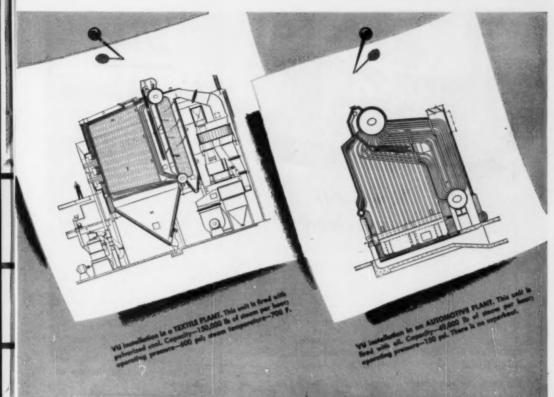


How different are <u>your</u> Steam Requirements?



COMBUSTION ENGINEERING

ALL TYPES OF BOILERS, FURNACES, PULVERIZED FUEL SYSTEMS AND STOKERS; ALSO SUPERHEATERS, ECONOMIZERS AND AIR HEATERS



Every engineer knows that steam requirements vary from industry to industry . . . from plant to plant. It is virtually certain, therefore, that your particular conditions of fuel, load, capacity, pressure and temperature are not exactly the same as those of any other plant.

Yet the C-E Vertical-Unit Boiler can deliver top performance in your plant . . . just as it has done in hundreds of others . . . representing a wide variety of steam conditions.

This is because the basic design of the VU allows exceptional latitude in the selection of the right boiler to fit your particular requirements. It is available in capacities from 10,000 to 350,000 lb of steam per hr, with pressures from 160 to 1000 psi and temperatures up to 900 F, or more. It is adaptable to limited space conditions and to the use of any fuel or method of firing. The VU

may be operated over a wide range of output, and, depending on fuels and the use of hest recovery equipment, efficiencies range up to 88%.

How well is the Vertical-Unit Boiler meeting the steam requirements of different industries? The answer is to be found in an impressive record of orders and repeat orders covering virtually every field. If you would like first hand information on the story of the VU Unit in your industry we would be glad to send it to you.

The point is that the story is the same...in industry after industry... the popularity of the C-E Vertical Unit Boiler is widespread and steedily increasing. Why not investigate how the variables of your requirements can be matched with the VU Unit for top performance?

- SUPERHEATER, INC.

200 MADISON AVENUE, NEW YORK 16, N. Y.





For use in the production of . . .

Antifreeze Cellophane Alkyd Resins Industrial Explosives Synthetic Fibers Hydraulic Fluids

For these and many other uses the high purity and uniformity of Jefferson ethylene glycol meet the most exacting demands of experienced chemical manufacturers.

For information on price and availability write today to our Sales Division, Department G.



* National defense requirements have created emergency demands for Jefferson chemicals. Our facilities are being expanded as rapidly as possible to cope with these requirements. We welcome your inquiries and will make every effort to serve you.

Quicklime silo and lime slakers in ethylene oxide and glycol unit at Jefferson's Neches plant.

Jefferson Chemical Company, Inc.

711 FIFTH AVENUE, NEW YORK 22, N. Y.



SSENTIAL CHEMICALS FROM HYDROCARBON SOURCES

ETHYLENE BLYCOL ETHYLENE BLYCOL DIETHYLENE BLYCOL

Briefs

From recent literature

No. 3 in a Series

Improved dyed nylon fibers are obtained by following a conventional dying and fixing procedure with passage of the dyed fiber into 75% aqueous ethylene glycol maintained at its boiling point. The fastness of the dye to light, washing and rubbing is thus substantially increased.

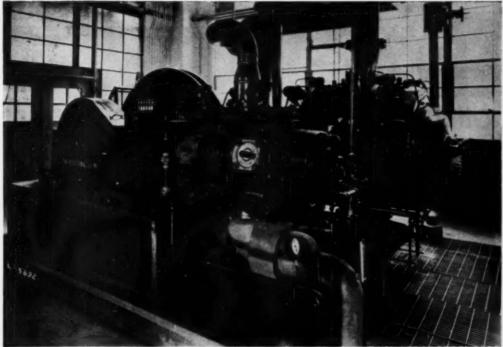
Polymers varying from viscous oils to hard resins result when ethylene glycol or diethylene glycol are reacted with divinylsulfone in the presence of a basic catalyst. Ethylene dichloride may be used as a solvent. Certain of these polymers have proven useful as thermoplastic molding compositions and in the production of fibers.

Hydrocarbons produced by the catalytic conversion of carbon monoxide and hydrogen are partially purified by extraction with ethylene glycol, which removes the oxygen-containing impurities.

Polymeric materials suitable for use as paint vehicles, coating agents for glass, and for insulation of electrical conductors result from the reaction of ethylene glycol with carboxyphenylsiloxanes.

Synthetic rubber scrap may be regenerated by devulcanizing, masticating with ethylene glycol, and then refining the product.

These developments are abstracted from recent publications or U. S. patents. They may suggest applications of Jefferson Ethylene Glycol in your products or processes.



One of over 300 compressors purchased by the same chemical company. It's a Worthington DC-2 gas compressor.

What One Word – Here – Solved Over 300 Compressor Problems?



Over 300 times in the past ten years, a mid-western chemical company has had a compressor problem.

Sometimes the problem involved a small compressor, sometimes a giant. All types of drives. All types of applications—including pulling a vacuum. Almost invariably, they solved the problem with one word—"Worthington".

To help solve your compressor problems, Worthington offers more compressors for compressing more gases than any other manufacturer.

*Reg. U. S. Pat. Off.

Remember, too, that Worthington compressors are the only ones with Feather* Valves—the simplest, lightest, highest quality valves made.

Write for Bulletin... to Worthington Pump and Machinery Corporation, Compressor Division, Buffalo, N. Y.

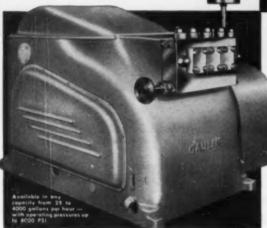
WORTHINGTON





What's the Difference Between a COLLOID MILL -





- and an HOMOGENIZER? ...Which One Should You Use?



GAULIN PILOT PLANT HOMOGENIZER

HOMOGENIZER
Ideal for experimental purposes, operation or process up to 25 gallons per hoar capacity. Handles quantities as small as one pint. Available on low rental basis.

There's actually a big difference — although in some applications they accomplish similar results. A Gaulin Homogenizer forces the product under high pressure through a two-stage valve assembly, where it passes at tremendous speed through two microscopic orifices — shears, shatters and explodes into a finer . . . uniform . . . stable emulsion or dispersion.

The Colloid Mill forces the liquid slowly between a stator and a high-speed rotor. Here, shear forces created by the rotor break the liquid particles into a fine emulsion or dispersion.

Viscosity is controlled in the homogenizer simply by adjusting the pressure ratio between the two valve stages. In the Colloid Mill, by increasing or decreasing the distance between the stator and the rotor.

There are, of course, applications where one does a better job than the other. Since we make them both we're completely impartial. We'd be glad to advise you which is best for your application. Write today.

Manton-Gaulin Manufacturing Company, Inc.

54 Garden Street, Everett 49, Mass.

World's Largest Manufacturer of Homogenizers, Triplex Stainless-Steel High Pressure Pumps, and Calloid Mills



Sulphu



Thousands of tons mined daily, but where does

it all go?

OOK AROUND YOU and let your glance fall on any object. The chances are 1000 to 1 that sulphur played an important role in its manufacture, either as a component part of the finished product or as a processing element.

Take, for example, the very magazine you are reading. If it's average size it weighs about 1 pound. Made largely of sulphite pulp it required about 0.1 pounds of sulphur in its manufacture.

Multiply this 0.1 pounds of sulphur by the thousands of magazines turned out every day and you'll get some idea of the tremendous tonnage of sulphur required for this single division of industry . . . the sulphite pulp manufacture.

Sulphur has long been called One of the Four Pillars of Industry. Today's need emphasizes this fact more than ever. Sulphur producers are making every effort to get maximum production from existing mines and to develop new sources of sulphur as quickly as possible.



Texas Gulf Sulphur Co.

75 East 45th Street, New York 17, N. Y.

Mines: Newgulf and Moss Bluff, Texas



GRAVITY Water Pressure for North Carolina fertilizer plant

The 60,000-gal. Horton elevated tank shown above was recently installed to provide better water service at the Statesville, North Carolina, fertilizer plant of the Robertson Chemical Company.

Horton elevated water tanks offer many advantages to the industrial plant that often mean greater efficiencies and timely savings. With elevated storage, you have the assurance of more uniform water pressure throughout the day. You also have a reliable water reserve under gravity pressure which, when coupled with an automatic sprinkler system, provides better fire protection.

Look into the benefits of Horton elevated tanks. You can save on operating and insurance costs—yer realize long term economy and safety with these modern structures. Standard capacities range from 15,000 to 500,000 gallons. Write our nearest office for information or quotations.

CHICAGO BRIDGE & IRON COMPANY

Atlants 3. 2120 Healy Skig. Birminghem 1. 1510 North Frireth St. Boston 10. 1005—201 Devombirs St. Chicago 4. 2124 McCormick Bidg. Claveland 15. 2220 Goildhell Bidg.	Detroit 26	Philadelphia 3 . 1625—1700 Walnut St. Bldg San Francisco 4 . 1522—200 Bush St Scattle 1 . 1305 Henry Bldg Tuten 3 . 1623 Hunt Bldg Washington, D. C. 1160 Cefritz Bldg
---	------------	--

Proportioning

CUTS YOUR PROCESSING



Four Size 20 and one Size 30 Belt Gravimetric Feeders.

Flour blending at the Owosso, Michplant of Harris Milling Co. is a good example of how Omega Continuous Weighing Feeders pay off in processing plants. This 80 year-old company employs the very latest in the automatic processing equipment — an engineered installation of Omega Belt Gravimetric Feeders — to proportion pancake flour and self-rising cake flour ingredients. These feeders deliver the dry ingredients (flour, soda, phosphate, salt, etc.) at the correct rates of flow needed to produce finished blends containing the exact proportions required by formula.

Omega Belt Gravimetric Feeders offer many advantages in process blending:

Simple Mechanical Control, using OMEGA suspended wedge proportional band controller—rugged, with no electrical circuits.

Wide Feeding Range, infinitely adjustable over a 100 to 1 range.

Accurate within \pm 1% over entire range specified.

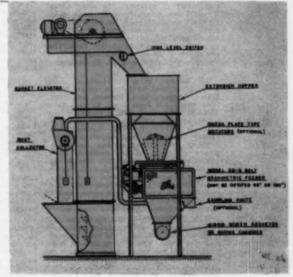
Capacities from a few pounds to tons per hour . . . three sizes of feeders available.

Compact Design conserves floor space.

Dust-Tight Housing with entire mechanism enclosed but accessible through liftoff transparent doors on three sides.

Totalizer of Register-Type With Convenient Vernier reading directly in pounds of material fed.

For full details on Omega Feeders and Omega Blending Systems, address Omega Machine Co. (Division of Builders Iron Foundry), Harris Ave., Providence 1, Rhode Island.



Typical installation of Size 50-8 Belt Gravimetric Feeder.



OMEGA THE LAST WORD IN FEEDERS



Omega manufactures a complete line of volumetric and gravimetric feeders for dry materials and for gravity feeding of liquids and solutions.

TYGON Versus CH, COOH

OMBATTING the attack of acetic acid has long been a problem to plant designers, process engineers, and main-tenance men. Virtually all of the usual corrosion-resistant materials have been tried, but few have proved completely successful. Even the family of TYGON plastic compounds with its unusual versatility and chemical resistance is not the complete answer. However, with proper use, TYGON can, and does, give economical, enduring protection against acetic acid in many instances.

Essentially, TYGON consists of polyvinyl resins carefully modified with other materials to give the optimum in chemical and physical properties. However, because of its organic nature the resistance of TYGON to organic nature the resistance of TYGON to acetic acid varies according to the specific compound and physical form used and the conditions of exposure. In some cases, TYGON has failed. In many more cases, TYGON has done a job no other material could do. The key to success of TYGON against acetic acid lies in the use of the right compound and the right physical form. The key to use of the right compound and form lies in consultation with U. S. Stoneware engineers.

For instance, as a press-polished sheet TYGON is used to line or cover tanks, drums, hoppers, bins, blowers, impellers, fume hoods and fume ducts. In such uses, TYGON resists acetic acid, in concentrations up to 15% by weight, at temperatures as high as 165-175°F. With concentrations the temperature limit greater than greater than 15%, the temperature limit drops to 150°F. However, these limits may change according to the conditions of a specific application. Particularly does the use of acetic acid with its anhydride, other acids, or certain solvents make a difference. In addition, the TYGON compounds used in lining work usually are not recommended, because of toxicity, for use with foods. Thus, it is wise to consult a qualified engineer.

With TYGON sheets that are die-cut and used as gaskets, advice on chemical resistance is less essential. Because of the small exposed area of a gasket, TYGON can be used with accetic acid in any concentration and at temperatures up to 200°F. However, certain conditions such as high pressures or use with foods warrant consultation. A molded gasket

reinforced with glass fibers may be needed to handle the pressure, while a gasket of a non-toxic TYGON compound must be used for food

When using molded TYGON as gaskets, grommets, washers, stoppers, handles, bumpgrommets, wasners, stoppers, nancies, oumpers, or special fittings, concentration of the acid is not a factor and temperature limits again range as high as 200°F. Advice is suggested, however, on design of the piece, on questions of toxicity, and on use with

In extruded form, TYGON is used primarily as tubing or piping although extruded solid cord, channel and tape are also used as gasketing and coverings. As an extrusion, TYGON resists acetic acid in any concentration and at temperatures up to 200°F. Where tubing is used as flexible connections, as transfer lines, as ports on acid pumps, or as transfer lines, as ports on acid pumps, or as syphon hoses, engineering advice usually is not necessary because of the number of standard formulations and sizes (up to 2" ID) available. However, in work with constant pressures of more than 40 psi or mixtures with other chemicals, braided jacket reinforcement or other precautions may be needed and consultation is suggested.

As a paint, TYGON is used to protect all types of equipment, structural steel, walls and ceilings against the fumes and spillage of acetic acid, but only under mild conditions. The physical limits of a thin film prevent the recommendation of TYGON Paint against fumes and spillage of high concentration and at elevated temperatures. In all uses with acetic acid previous tests are suggested.

As a plastisol (TYGOFLEX), TYGON finds use as a heavy duty coating and in the casting or "slush" molding of flexible parts and fittings. As such, its resistance to acetic acid varies according to the thickness of the TYGOFLEX involved, but usually is com-parable to that of gasketing.

Although its use against acetic acid is approached rather conservatively, as compared to its use with other chemicals, TYGON can provide long lasting and low cost protection. Its flexibility, toughness, abrasion resistance, and in some cases, clarity, permit its economical and advantageous use in many applications.



In addition to TYGON in its various forms, we also manufacture a number of other materials capable of bandling acetic acid in any concentration and under all types of operating conditions. These products include chemical stoneware and porcelain, acid proof brick and cements, homogenous lead linings, and other organic linings and coatings.

Wby don't you submit your corrosion problem today? There's no obligation and we'll be pleased to be of assistance. So write, now!

THE UNITED STATES STONEWARE CO., Akron 9, Ohio

ENGINEERS, MANUFACTURERS, ERECTORS OF CORROSION-RESISTANT EQUIPMENT SINCE 1865

THE Chementator

Prepared under the editorial direction of Joseph A. O'Connor, News Editor

Newcomer in acrylonitrile

Watch for a big new petrochemical venture. It's a \$20 million undertaking, and involves construction of a plant near Calvert City, Ky., to produce ethylene glycol and acrylonitrile. Pittsburgh Coke & Chemical Co. will make these chemicals from hydrocarbons stripped from the natural gas traveling through the pipelines of its corporate cousin, Texas Gas Transmission. Warren Petroleum will market the liquefied petroleum gas. Air Reduction is also flirting with the idea of joining Pittsburgh in the new enterprise.

New vanillin process

Ontario Paper Co., Ltd., has come up with a new process for getting vanillin from waste sulphite liquor, will bring in a new \$1.3 million plant at Thorold, Ontario, this year. Initially, the plant will produce 400,000 lb. a year. The company thinks the new process will mean cheaper vanillin, open up new markets. Dow's Bush Aromatics Division will market most of the output.

Nub of Ontario's process is the use of lime instead of caustic soda to form the lignosulphonate. Lime is added to the waste sulphite liquor. The liquid and sludge that result are agitated, and air is bubbled through. After oxidation, most of the calcium vanillate is present in the liquid phase, which is separated from the sludge and then acidified with carbon dioxide to get the vanillin.

Besides vanillin, Ontario Paper will turn out vanillic acid, acetovanillone and other products. Ontario will get stiff competition from Monsanto's new vanillin enterprise on the West Coast and from Marathon Corp. But if annual output of vanillin is pushed over 1 million pounds a year by the competition its \$3 a lb. price tag may have to come off.

No more certificates for chlorine plants

A goal of 3,430,000 short tons a year by 1955 has been set by DPA for U.S. chlorine production. But no new certificates of necessity will be required to reach this objective unless some present projects are abandoned. It can be achieved by already scheduled expansions.

Chlorine expansion got off to an early start. For one thing, producers and the government foresaw the mounting demand that mobilization would bring. For another, most production is captive and manufacturers pushed expansion so they wouldn't be caught short. About three-fourths of the chlorine produced goes into other chemicals, many vital for defense.

New target for sulphur capacity

PAISED SIGHTS—DPA has lifted its sulphur expansion goal to an annual U. S. production of 8.4 million long tons by 1955. That's an increase of almost 1,250,000 tons over the previous target of 7,150,000 tons by 1955.

MORE CERTIFICATES—This action paves the way for DPA to issue more certificates of necessity for fast tax amortization. It will also permit other government agencies, such as the Defense Materials Procurement Agency, to extend, if necessary, loans and purchase contracts.

More than 75 percent of the sulphur consumed goes into sulphuric acid. The fertilizer industry uses close to 40 percent of the sulphuric acid to convert phosphate rock into phosphate fertilizers and to make ammonium sulphate. Largest use of sulphur, other than in making acid, is in pulp manufacture.

MOUNTING DEMAND—Since 1900, world use of sulphur has increased more than seven-fold. Postwar consumption has been 50 percent greater than prewar. DPA estimates U.S. requirements by 1955 will be 43 percent greater than in 1950.

Europe's chemical industries, rebuilt with U.S. aid, now depend largely on cheap Gulf Coast sulphur instead of the pyrites they once used. By 1948, Gulf sulphur accounted for more than 90 percent of the world production of native sulphur, and more than the entire world production of sulphur from pyrites.

CURRENT DEFICIT—Since 1950, output of Gulf sulphur has been insufficient to meet U. S. and foreign requirements. Despite discovery of new sulphur domes, supply has been so short that controls had to be slapped on sulphur and sulphuric acid. There's not enough sulphur in sight now to prevent a growing deficit.

OBJECTIVE—That's why the new sulphur expansion goal had to be set. What DPA envisages is: (1) a cutback in U. S. sulphur exports as foreign countries develop other sources; and (2) increased U.S. production, not only from new domes but also by

(Continued on page 104)

THE CHEMENTATOR, continued

recovery from petroleum and natural gas, pyrites, smelter acid and other sources.

BREAKDOWN—A net increase of about 1,080,000 tons in sulphur supply, compared with 1950, has already been provided for. The Defense Materials Procurement Agency estimates that output from facilities existing in 1950 will, by 1955, have declined by 690,000 tons. Partly offsetting this, expansion undertaken by private enterprise on its own will have bolstered supply by 520,000 tons.

Government-backed expansion, under the present DMPA program, will by 1955 have provided 690,000 tons of native sulphur; 280,000 tons from petroleum and natural gas; 170,000 tons from pyrites; 100,000 tons from smelter acid; and 10,000 tons from other sources.

Twenty questions, Washington style

AEC officials and Du Pont spokesmen spent a total of 4,100 man-hours answering the questions of congressional investigators just during the months of September and October, two investigators of the Senate-House Defense Production Committee recently disclosed. Du Pont reiterated its earlier contention: the investigations come too often, last too long.

New phosphate plant for Tennessee

A \$3 million phosphate processing plant will be built at Godwin, near Columbia. Tenn., by the Shea Chemical Corp., newly formed Tennessee corporation headed by Vincent H. Shea of Lowell, Mass.

The new chemical plant, to occupy 140 acres, will produce elemental phosphorus by the electric furnace process, then convert the phosphorus to phosphoric acid for the production of dicalcium phosphate. Capacity: about 70,000 tons of dicalcium phosphate a vear.

Raw phosphate will come from neighboring phosphate mines. The furnace and nodulizing plant will be of latest design, including a fluorine scrubber. Construction is just getting under way.

Big expansion in silicones

Dow Corning will invest over \$13 million in a major expansion of plant capacity for its silicone products. The program won't be completed until 1954, but construction is already under way. In fact, a small part of the new capacity is now in operation, and other units will be put into operation as fast as they are completed.

The new plant facilities are essential to the national defense, and will get fast tax amortization. One certificate of necessity for \$10,194,000, just approved by DPA, calls for substantial production facilities and general plant services to make basic silicone fluids and

resins. Three others, previously approved, involve the following outlays by Dow Corning: \$560,000 for a plant to produce metallic silicon; \$820,000 to build a methyl chloride unit; and \$1,460,000 for a plant to produce silicone rubber. All of the new capacity will be at Midland, Mich.

Rocketing ahead in hydrazine

Mathieson Chemical has completed plans for its new \$2.15 million plant at Lake Charles, La., to make hydrazine. Mathieson will get a fast tax writeoff on the plant. Construction is just getting started.

Solvay moves deeper into organics

Solvay is going into organics in a big way. It's taking the plunge by building a \$5 million plant near Orange, Tex., to make ethylene oxide and ethylene glycol. Ethylene will come from Port Arthur, Tex., via pipeline, most likely from Gulf's new ethylene plant there. The Solvay plant will take two years to build.

Elsewhere, Solvay is adding to its chlorine-caustic capacity. It will construct a mercury cell plant on a 400-acre site near Moundsville, W. Va., at a cost of \$15 million. The plant will be completed in about two years. Brine will come from deposits on the site.

Trend to continuous nitration

NEW PROCESS—First continuous nitration process in a commercial explosives plant on the North American continent will go into operation this spring at the new plant of Canadian Industries Ltd. near Calgary, Alberta. It's the Biazzi process, and Du Pont will also use it in a new explosives plant to be built at Martinsburg, W. Va. So will other installations now under security wraps. It all adds up to a trend toward continuous nitration.

GREATER SAFETY—Biggest advantage of the Biazzi process is the added safety it affords: less material is present in the reactor at any given time. At Calgary, for example, a batch reactor holds about 7,000 lb. of sensitive nitroglycerine, compared with only 100 lb. in a Biazzi nitrator. What's more, automatic controls cut off the feed if power fails or the temperature in the reactor gets too high.

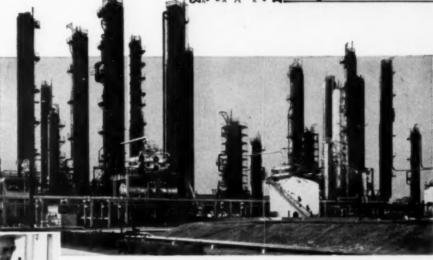
TOO BIG—Up to now, the batch process has been used almost exclusively in this country. In the batch process, one reactant (either acid or organic compound) is slowly added to the other. Equipped with multiple cooling coils and agitators, batch nitrators are big vessels ranging from 500-gal. to 3,000-gal.

COMPACT AND CONTINUOUS—In contrast, the Biazzi process employs highly compact equipment. For example, equipment to process 2,500 lb. an hr. of nitroglycerine takes up only 90 sq. ft. The Biazzi nitrator itself is a cylindrical stainless steel vessel with a helical cooling coil and internal agitator. Instead of passing through intermediate scale tanks as in the batch

(Continued on page 108)

INSUL-MASTIC Vapor

barrier keeps insulation dry



Here's what happens when insulation is improperly coated. This became watersoaked. The resultant rust still clings to it. Inadequately weatherproofed insulation leads to trouble . . . trouble that can be averted by Insul-Mastic Coatings.

In more and more industrial plants, engineers are replacing their watersoaked insulation . . . using non-absorbent Insul-Mastic Type "D" . . . and in places where more insulation is required, new, dry conventional insulation is being protected with Insul-Mastic vaporseal and glass membrane.

Recently in a large plant the steel shells of huge fractionation towers were very badly rusted and pitted because of watersoaked insulation. An inferior coating over the insulation had permitted moisture and rain to penetrate. To prevent further damage to the shells, the insulation had to be

removed.

Where temperatures did not exceed 225°
F., Insul-Mastic Type "D", the spray applied cork filled, non-absorbent insulation, was applied. Where temperatures exceeded this figure, standard thermal insulation was applied and sealed with Insul-Mastic vaporseal and glass membrane.

Engineers are preventing this situation from occurring in their plants by specifying Insul-Mastic high quality, homogenized Coatings, when working out the plans for the insulation and protection of new units and equipment.

There is an Insul-Mastic applicator near you. Write for his name today and check the condition of your insulation now!

Think first of the coatings that last !

Insul-Mastic Corporation

1156 OLIVER BUILDING PITTSBURGH 22, PA Representatives in Principal Cities



d-c power in with an 2 minutes

Practically instantaneous starting is one of the many advantages you get by using the I-T-E Mechanical Rectifier. This source of low-cost d-c power in the 50 to 400 volt range can be on the line, operating at full load, within 2 minutes of the time the starting button is pushed. Even less time is required if the rectifier is not used in parallel with other types of d-c sources.

There are only 5 quick steps to starting—4 to stopping the equipment. These are easily performed by unskilled labor.

I-T-E Mechanical Rectifiers have no large rotating masses which must be brought up to speed before going on the line. No warm-up period is required—no waiting for vacuum build-up. This means the I-T-E Mechanical Rectifier has maximum availability for your process.

For further information, write I-T-E Circuit Breaker Company, 19th and Hamilton Streets, Philadelphia 30, Pennsylvania. Ask for Bulletin 5106.

INSTALLATION IS FAST, TOO!

A complete installation can be unloaded, installed and placed in operation in a relatively short time. This is possible because of:

- · Packaged delivery.
- Factory-wired and labeled control circuits.
- · Truck-mounted, movable rectifying units.
- Overhead bus (no trenches or basement preparation).
- Compactness of the design.



The 10,000 ampere mechanism pictured will supply d-c power to a chlorine cell line.

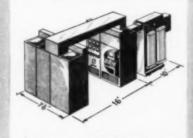


Diagram of typical mechanical rectifier installation. All elements of the unit including operating aisle are arranged in an area of 120 square feet. This does not include area occupied by transformer which is usually located outdoors.

I-T-E Mechanical Rectifier

All you do to start the I-T-E MECHANICAL RECTIFIER

- Push button to close a-c breaker.
- 2 Adjust d-c voltage to desired value.
- 3 Close d-c disconnect switch. (Not Shows)
- 4 Push button to close d-c breaker—you're on the line!
- 5 Adjust d-c current to desired value—automatic current regulator will hold that value—within ±1%!

I-T-E MECHANICAL RECTIFIERS OFFER THESE ADVANTAGES:

HIGH EFFICIENCY

96% or more in the 50 to 400 d-c voltage range.

SMALL SPACE REQUIREMENT

compact design, neat appearance.

LOW BUILDING INVESTMENT

no need for special foundation or unusual construction.

LOW INSTALLATION COST

put rectifier in place, connect, operate.

AVAILABILITY FOR SERVICE

no warming-up or speed-up period.

LOW MAINTENANCE COST

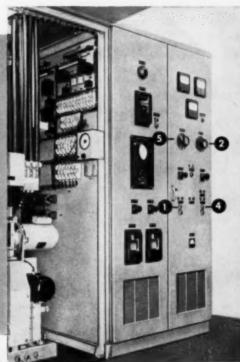
main contacts need only occasional replacement.

RUGGED TRANSFORMERS

conservative construction—latest design.

SIMPLE VOLTAGE CONTROL

voltage or current automatically controlled between ±1%.





MECHANICAL RECTIFIERS

1-T-E CHRCUIT BREAKER CO., 19th AND HAMILTON STS., PHILA. 30, PA.

R&IE EQUIPMENT DIVISION, GREENSBURG, PA.

CANADIAN MFG. AND SALES: EASTERN POWER DEVICES, LTD., TORONTO

EXPORT SALES: PHILIPS EXPORT CO., NEW YORK 17, NEW YORK

method, feed enters directly from storage tanks through the cover of the nitrator. Nitrated product and spent acid are continuously withdrawn from the side of the nitrator. Agitation helps to speed up the reaction. Hence productivity per unit volume is high. And, correspondingly, time in the reactor is short. After separation, the product is washed in a series of connected stainless steel tanks. High-speed mechanical agitators effect the mixing. Washing is fast and efficient.

FLEXIBLE—The Biazzi process can be used to nitrate a variety of compounds. Among them: glycerine, mono- and diethylene glycol, pentaerythritol, benzene, chlorobenzene, naphthalene, cresol and toluene.

Biazzi process are potentially lower labor costs, greater surface area for cooling in the smaller nitrator, and economical operation based on the compact plant and faster reaction. But safety is the overriding superiority.

New hydrocarbon oxidation process

Hercules will build an \$8 million plant to produce phenols from aromatic hydrocarbons and cresols from terpene hydrocarbons by a unique oxidation process. When completed in 1953 the plant will turn out about 15 million pounds a year of phenol, 5 million pounds of para-cresol and 5 million pounds of cymene alcohols. In addition, as a byproduct of phenol manufacture, it will produce 12 million pounds of acetone, much of it doubtless for use by Hercules in its Parlin, N. J., acetic anhydride plant

Phenol will be made from cumene by oxidizing it to cumene hydroperoxide, which breaks down into acetone and phenol. The cumene, which is isopropyl benzene, is made from propylene and benzene.

This production of an organic hydroperoxide is the core of the process. These hydroperoxides are readily converted to phenols. In fact, so simple and versatile is the Hercules process that other substituted phenols and phenolic compounds can be produced at will, with minor equipment modifications, depending on the hydrocarbons oxidized. This adds to the economic attractiveness of the venture.

Para-cresol will be made from para-cymene. The processes for para-cresol and cymene alcohols and for phenol and acetone are similar enough so that much equipment can be used interchangeably; thus capacity for any product can be increased by reducing output of others in the processing cycle.

The new plant will be located in New Jersey in the Delaware River industrial area, where propylene and benzene for the manufacture of phenol can be obtained from nearby refineries and coke ovens. The benzene, for example, could come from the new Fairless Works of U. S. Steel. Terpenes, raw materials for the new para-cymene process, will come from Hercules naval stores operations in Georgia and Mississippi. Hercules, although it does hold U. S. patents, was not the first to hop aboard the phenol-from-cumene bandwagon. B.A. Shawinigan, Ltd., is building such a plant in Montreal. Allied's Barrett Division is putting one up near Philadelphia, and Standard of California is building another on the West Coast. And now comes Monsanto with word that it will manufacture phenol in a new plant at Avon, Calif., by "a process recently developed by the company." Monsanto's plant will be ready for production early in 1954.

One big advantage of the phenol-from-cumene process is that it deftly sidesteps use of currently scarce sulphur and chlorine. Right now, U.S. phenol capacity is about 400 million pounds a year, and demand exceeds supply. Most of this output is made by the sulphonation and chlorination processes.

Potash workers switch to District 50

More than 1,000 employees at the Trona, Calif., plant of American Potash & Chemical Corp. have switched their affiliation from the independent Mine, Mill & Smelter Workers to the catch-all District 50 of John L. Lewis' United Mine Workers.

Just before the contract expired, the local met and voted to disaffiliate from the Mine, Mill & Smelter Workers. About 67 percent of the workers signed cards approving the switch to District 50.

After having the cards checked by an independent auditing firm, American Potash cancelled its contract with the Mine, Mill & Smelter Workers, under the five-day notice clause, and negotiated a contract with UMW.

The new contract runs for 18 months and provides for an 8-c. hourly wage increase, plus 2 c. more to eliminate plant inequities, and other fringe benefits that tot up to about 11 c. an hr. The 8-c. hike is permitted under federal wage controls and is immediately effective. The other adjustments await Wage Stabilization Board approval.

The Mine, Mill & Smelter Workers has petitioned NLRB for an election among the employees. If NLRB agrees to the election, it will provide merely for a vote on whether the workers want continued representation by the Mine, Mill & Smelter Workers. The UMW could not appear on the ballot since it has never qualified for an NLRB election by filing non-Communist affidavits.

Foreman fired for helping chemical union

Under the Taft-Hartley Law, a supervisor may be fired for union activities, but not for refusing to engage in an unfair labor practice. Applying this view of the National Labor Relations Board, a trial examiner has recommended dismissal of a union complaint against the U.S. Phosphoric Products Division of (Continued on page 110)



Standard worm gearing and standard speed reducers, or specially engineered units to west any machinery manufacturer's requirements, are Cleveland's business.

Does this drive have a performance record for months from the following service? ouble-free, encient service;

Does it permit best arrangement of equipment, occus
using least floor space?

these questions: trouble-free, efficient service?

ving least floor space? Will it operate under adverse conditions, with mini-num attention? pying least floor space?

um attention?

Is its life unlimited, making replacement unnecessary?

Is its life unlimited to the life item of the life item. Is its lifetime cost lowest?

Because for nearly 40 years Cleveland has answered "Yes", you'll find Cleveland all these questions with a worm gear speed reducers worm gearing and Cleveland worm gearing and Cleveland worm gears of the toughest drive jobs in industry on thousands of the toughest drive jobs in industry. worm gearing and Cleveland worm gear speed reducers in the second of the toughest drive jobs in industry.

That's why Clevelands are preferred—known as the finest among fine worm gear drives.

Write for the new Cleveland Worm Coar Speed Reducers Write for the new Cleveland catalog, showing all the types and sizes of Cleveland Worm & Gear Comnany.

The Cleveland Worm & Gear Comnany. types and sizes of Cleveland Worm Gear Speed Reducers on available. The Cleveland Worm & Gear Company,

now available. The Cleveland Worm & Ge 3273 East 80th Street, Cleveland 4, Ohio. Affiliate: The Fareal Corporation, Centralized Limited.

Lubrication. In Canada: Peacock Brothers Limited.

CLEVELAND Drives

THE CHEMENTATOR, continued

Tennessee Corp., Tampa, Fla., for firing a labor foreman.

The examiner disagreed with the charge of the AFL Chemical Workers that the foreman was fired for refusing a company request that he stop helping this union and work, instead, for an independent employees' association. The evidence showed that the foreman was fired simply for helping the AFL chemical union organize the plant, the examiner found.

C10 Chemical Workers in all-out drive

A drive for more members, higher wages and improved insurance and welfare benefits was planned by the CIO United Gas, Coke & Chemical Workers at its executive committee meeting in Washington.

The "most comprehensive organizational drive" the Gas, Coke & Chemical Workers has ever undertaken is already started with CIO support, the union claims. CIO backing amounts to a 40 percent increase in organizing funds for GCCW, providing more organizers and other assistance worth \$10,000 a month. Activities are coordinated in all of the union's 11 districts.

Membership is up by about 20,000 since September 1950, the executive committee says.

To help local unions get more fringe benefits, the committee has engaged the Employes Insurance Service Co., Huntington, W. Va., as consultant on insurance and welfare plans. The union figures welfare benefits will help the membership drive.

More effective locals can help get members, too. So GCCW will run a week-long labor institute in June at Pennsylvania State College. Members chosen by locals will study local union administration, grievance handling, wage rate problems, union counseling, human relations, workmen's compensation, safety and labor's role in a mobilizing economy.

Companies with which the union has contracts are being asked what wage increases they have given since January 1950. The National Labor Relations Board says unions are entitled to this data. Locals will, of course, demand more money from companies that haven't granted all the wage control rules allow.

Other committee action: implemented CIO plan for settling jurisdictional disputes by delegating international officers to prepare and submit cases to the CIO for decision.

Greater lithium output coming

Lithium Corp. of America, Inc., is launching a \$425,000 plant expansion. First step is construction of a \$250,000 new type flotation mill for recovering spodumene concentrates from the company's ore deposits in the Black Hills area of South Dakota.

Second phase of the program is the enlarging of present facilities at the company's Metalloy Corp. Division plant in Minneapolis to increase production of lithium metal and lithium compounds. The cost will exceed \$175,000.

Accelerated demand by industry for lithium sparked the expansion. Increased production resulting from this expansion is expected to become available during the early part of this year.

Chlorine and caustic for Northwest

Hooker Electrochemical will shell out \$5 million to expand chlorine and caustic soda output at its Tacoma, Wash., plant.

The company will purchase a big acreage from the Tacoma Port Authority. The chlorine and caustic will go principally to the growing pulp and paper industries of the Pacific Northwest.

Another Kel-F price cut

For the third time since it was first put on the market four years ago, Kel-F has been reduced in price. New prices for the low and high density molding powders in ton lots will now be \$11 and \$12 a lb. respectively, a cut for each of \$1.30. Prices for plasticized molding powders will also be reduced on an average of \$3 a lb., as a result of lowering the price of the plasticizer to \$12 a lb. In ton lots, this will mean a price of \$13 a lb. Kel-F dispersions, which can be applied as corrosion-resistant coatings, remain unchanged at \$15 per lb. of solid content. When M. W. Kellogg Co. first introduced the fluorocarbon thermoplastic, it sold for about \$26 a lb.

Monsanto goes after more capital

Having just sold an entire \$66 million issue of debentures to six institutional investors, Monsanto will now offer 400,000 shares of new common stock to the public.

The debenture issue covers 50-year 34 percent income debentures. Interest on the issue is cumulative and payable annually only if earned. Sinking fund payments beginning after 30 years will suffice to retire half the issue by maturity. At its own option, Monsanto can make additional sinking fund payments during the life of the debentures.

Monsanto will offer the 400,000 shares of its new common stock to the public this month through a nation-wide group of underwriters headed by Smith, Barney & Co. Offering price will be about the same as the market price just before the stock is put up for sale.

The company's consolidated net sales in 1951 were about \$272,800,000 and net income was approximately \$23,476,000, amounting to \$4.70 a share of common stock outstanding at year's end.

Monsanto expects to add proceeds of the stock sale to its general funds, available, among other things, for carrying further its expansion program involving capital additions to plants and facilities.

—End



Disodium Phosphate ANHYDROUS

Na₂HPO₄

Trisodium Phosphate Na 1PO4 - 12H2O

Sodium Tripolyphosphate ANHYDROUS

NasPaOIA

Tetrasodium Pyrophosphate ANHYDROUS (TSPP) (Pyro)

No4P2O7

GENERAL CHEMICAL Phosphates

For Many Purposes

General Chemical pioneered in the manufacture of "wet process" phosphates over a half century ago. Out of its early work, the Company has developed specialized modern production techniques by which phosphates of highest quality and purity are being made to meet every industrial requirement.

Today, these techniques are enabling the Company to maintain peak outputs of the key phosphates listed here, independent of defense demands for elemental phosphorus and electrical power.

For your requirements, consult the General Chemical office serving you. Stocks are readily available from coast-to-coast distributing points.

GENERAL CHEMICAL

ALLIED CHEMICAL & DYE CORPORATION 40 Rector Street, New York 6, N. Y.

Offices: Albany * Atlanta * Baltimore * Birmingham * Boston * Bridgeport * Buffalo Charlotte * Chicago * Cleveland * Denver * Detroit * Greenville (Miss.) * Houston Jacksonville * Kalamazoo * Los Angeles * Minneapolis * New York * Philadelphia Pittsburgh * Providence * St. Louis * San Francisco * Seattle * Yakima (Wash.) In Wisconsin: General Chemical Company, Inc., Milwaukee, Wis.

In Canada: The Nichols Chemical Company, Limited * Montreal * Toronto * Vancouver























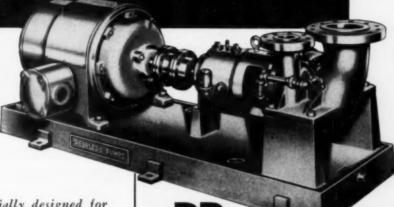




PEERLESS TYPE PR

A CENTER-LINE-MOUNT PUMP FOR HEAVY DUTY PROCESS SERVICE IN REFINERIES AND CHEMICAL PLANTS

Peerless BUILDS DEPENDABLE PUMPS



Especially designed for pumping Hydrocarbons, water and chemical solutions at elevated temperatures and pressures...

CHARACTERISTICS AT A GLANCE

CAPACITIES OPERATING Up to 1000 gpm

HEADS TEMPERATURES Up to 625 feet

CASE

Up to 600 psi

DRIVES

Horizontal electric motor is standard; others as required, such as steam turbine drive or stationary engine drive.

MATERIALS OF CONSTRUCTION Liquid end con be furnished in cast iron, bronze, carbon steel, stainless steel or other materials as required for the intended service.

LIQUIDS

Hot oil, propone, butone and all petroleum hydrocarbons, process liquids and water.

CHARACTERISTICS

Designed to operate with

type PR

FOR THOSE TOUGH HIGH-TEMPERATURE AND HIGH-PRESSURE APPLICATIONS IN REFINERY AND PROCESS WORK . . .

Maximum interchangeability, extra-heavy wall thicknesses, extra-low NPSH requirements and extra-rigid case-frame construction make the Peerless Type PR pump ideal for those rugged duty jobs in a large number of industrial services.

Furnished in a complete range of sizes, a Peerless Type PR will cover nearly all your pump needs. Available in various alloy materials. Adequate water-cooling jackets and water-cooled stuffing box, with mechanical seal optional, and heavy duty shaft with carefully balanced bearing design are features of the Peerless Type PR construction. Many sizes are available from stock in standard materials.



New Bulletin just off the press

Use coupon for Bulletin No. B-1605 which describes the exacting design and construction features of Peerless Type PR pumps.



PEERLESS PUMP DIVISION Food Machinary and Chemical Corporation 301 West Avenue 26 Los Angeles 31, California

Please send us capy of Peerless Type FR Pump Bulletta No. 8-1605.

PEERLESS PUMP DIVISION

FOOD MACHINERY AND CHEMICAL CORPORATION

Address inquiries to Factories at:
Los Angeles 31, California and Indianapolis 8, Indiana
Offices: New York, Chicago, 5t. Louis, Atlants; Dallos, Flatinriew and Lubbock, Texass,
Franci, Isa Angeles; Phoesinis; Albuquerque, N. M., Tules

1	
	co
ľ	STR

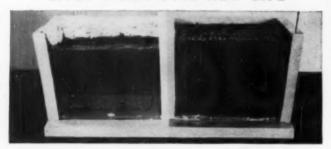
DMPANY

....

Chem. Eng.



MONSANTO'S NEW SOIL CONDITIONER GIVES WORN SOIL NEW LIFE



Mere's a demonstration of the effectiveness of Mansanto's new soil conditioner. The sample at the left is untreated. Notice how the soil has become packed. In the section at the right, identical soil has been treated with Krilium. The treated soil remains crumbly and will maintain this condition indefinitely.

Extensive demonstrations of Monsanto Krilium* soil conditioner will be conducted in 1952. Two years of experimental applications indicate its possibilities in reviving worn land, making marginal farms profitable and increasing production of ground where poor soil structure causes low yields. In addition to its agricultural uses, Krilium may be used profitably by the ceramics and oil-well drilling industries.

Production of the soil conditioner in 1952 will be no more than enough to conduct the demonstrations which are planned for various parts of the country. It is expected to be available for general use by planting time in 1953.

The soil conditioner, a synthetic resin, contains no plant nutrients. It shows promise of making commercial fertilizers more readily available to plant growth. This is the result of improved soil structure obtained through the use of the soil conditioner.

Krilium improves soil tilth, makes it more porous and easier to work. The ratio of improvement of soil structure with Krilium is on the order of one pound of the soil conditioner to between 100 and 1000 pounds of compost or other types of plant residues. The resin is quick-acting, giving observable results in 24 hours or less.

Improvement of poor soils is indicated, along with considerable increase in yields. Test plots show increases of 60% to 200%.

Increases result from better stands, faster germination, earlier maturity and greater plant structure.

Treated soils show less tendency to crust, making it easier for seedlings to bread through. The treated soil being more porous allows more oxygen to reach the roots and allows roots to penetrate more deeply into the ground.

Treated soils retain 30% to 40% more moisture, thus helping crops through drought periods. Greater resistance to revision is obtained through the application of Krilium to soil. Evaporation is retarded.

For information on the use of Krilium in agriculture, mail the coupon or contact the nearest Monsanto Sales Office.

Benzoic acid improves dyeing of new synthetic fibers

Mill runs on several of the newer synthetic fibers indicate that Monsanto Benzoic Acid makes possible thorough, all-the-waythrough dyeing. Without benzoic acid, these new fibers could be dyed only on the surface.

The use of benzoic acid has a swelling effect on the new fibers. This permits the dye to penetrate, giving level, long-lasting color.



BENTHAL IMPROVES BLOND FURNITURE FINISHES

Because it gives paler original color and imparts excellent color retention, Monsanto Benthal * is being used to make better finishes for blond furniture. Benthal replaces up to 20% of the cocoanut fatty acids in these finishes.

In addition to its use in blond finishes, Benthal, a monobasic acid, is employed to improve many short-oil modified resins in these eight ways:

- 1. Reduced acid value.
- 2. Reduced viscosity.
- 3. Improved color.
- Less yellowing on high-temperature baking.
- 5. Less after-bodying.
- 6. Better flow.
- Better film adhesion of pentaerythritol types.
- 8. Greater flexibility of dried films.

Benthal does not retard air drying or baking. It may improve the dried films' resistance to water or chemicals.

DO YOU USE EMULSIFIERS?

Write for Monsanto Technical Bulletins P-123 and P-142... They contain helpful information on formulating various insecticides, fungicides and herbicides.

Phenylacetic acid and derivatives worth investigating

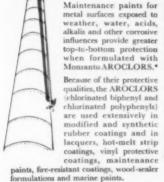
Monsanto produces phenylacetic acid and derivatives which have possibilities for the research chemist. These chemicals are believed to have many undiscovered uses. They have indicated uses as intermediates for pharmaceuticals (antispasmotics, sedatives, antiseptics, anticoagulants); for perfumes; for insect repellents.

Phenylacetic acid is a versatile aralkyl acid with a reactive methylene group.

Derivatives made by Monsanto include: Phenylacetonitrile, phenylacetamide, beta-phenylethylamine, potassium phenylacetate, methyl-phenylacetate, N-ethanolphenylacetamide, N-methylphenylacetamide.

If you wish to conduct experiments with any of these chemicals, samples will be sent to you without obligation. Contact the nearest Monsanto Sales Office or mail the coupon for prompt response.

FOR METAL SURFACES top-to-bottom protection



For technical information, write Monsanto ... Please state uses to which you wish to put the AROCLORS.

5 reasons for SANTOMERSE No. 1

To formulators of cleaning compounds, Santomerse* No. 1 offers numerous advantages in addition to its well-known effectiveness as an all-purpose detergent and wetting agent.

CONTROLLED DENSITY—Manufactured in three densities . . . gives you bulking to suit your products and markets.

COMPATIBILITY—Santomerse No. 1 is compatible with other detergents and builders.

EASY BLENDING—Available in flakes or granules, giving you a selection to blend readily with other ingredients without stratifying.

PROTECTED QUALITY—Santomerae No. 1 is shipped in wax-lined drums to protect quality in transit and storage.

PROMPT SERVICE—Santomerse No. 1
... warehoused in 13 cities, coast to coast
... will be shipped promptly from a point
near you.



LOOK INTO THIS

There's a new Monsanto high-molecularweight alcohol ester—AE-1—that had definite use possibilities in industrial proceasing. Among its present and suggested applications, the following may be of interest to you:

Defoamer in producing ethyl alcohol from molasses . . . defoamer in producing glycerol from fats . . foam control in the manufacture of yeast and other fermentations . . . elimination of foam in certain bottle-washing operations . . . solving foam problem in polystyrene latex water dispersions . . lubricant for vinyls that are extruded or calendered . . coplasticizer for rubber hydrochloride and chlorinated rubber.

For more information—also samples contact Monsanto, Write for Technical Bulletin P-140.

HB-40 OK for vinyls

OK and available now in drum or carload lots, Monsanto HB-40 will help you lower your vinyl production costs without any sacrifice in quality. The price is 17¢ per pound in less than carloads—lower in larger quantities. A partially hydrogenated terphenyl, HB-40 is used as a coplasticizer, or as an extender for primary plasticizers in vinyl extrusions, vinyl pastes, vinyl slush moldings, vinyl calendering.

For full information on physical properties, application and use of HB-40, get Technical Bulletin P-104.

MONSANTO CHEMICAL COMPANY, 1700 S. Second Street, St. Louis 4, Missouri. District Sales Offices: Birmingham, Boston, Charlotte, Chicago, Cincinnati, Cleveland, Detroit, Los Angeles, New York, Philadelphia, Portland, Ore., San Francisco, Seattle. In Canada, Monsanto Ganada Limited, Montreal.

*Itog. U. S. Pat. Off.



SERVING INDUSTRY . . . WHICH SERVES MANKIND

	SEND INFORMAT. Soil Conditioner. Santomerse No. 1.
ı	SEND LITERATURE: Emulsiflers. Defoaming Agent. Plasticizer Extendor (HB-40).
	SEND SAMPLES: Plensylacetonttrile. Phonylacetamide. beta-Phenylathylamine. Pota-Silum Phenylacetamide. Phenylacetamide. N-ethanolphenylacetamide. N-mellylphenylacetamide. Defoaming Agent Ac-1. MB-48.

MONSANTO CHEMICAL COMI 1700 South Second Street, St. L		
Please send, without cost or of at the left.	oligation, information, sam	aples or literature as indicated
Nans		Title
Company	***************************************	
Street	· //	
City	Zone	Store

NOW Quimby WITH WARREN SERVICE Pumps



Now you can look to Warren for Screw and Rotary pumps as well as Centrifugal and Reciprocating types.

Quimby built the first balanced quadruplicate screw pump in 1893. The salient design feature of separate screws and timed driving gears have never been changed. However, refinements through the years have widened the scope of applications

to include the handling of any nonabrasive liquid or semi-liquid at moderate and high pressures.

The "Rotex" is a superior rotary pump of unique construction that has numerous applications where moderate pressures are involved.

We are glad to add these new members to the Warren family and invite your inquiries on any problem involving Screw and Rotary, Centrifugal or Reciprocating Pumps.



Both Screw and Rotex type pumps are available either horizontal or vertical mounted.

WARREN PUMPS

WARREN STEAM PUMP COMPANY, INC., WARREN, MASSACHUSETTS

DOWTHERM HEATED PROCESS SYSTEMS

designed, fabricated and erected under one responsibility and with one overall guarantee

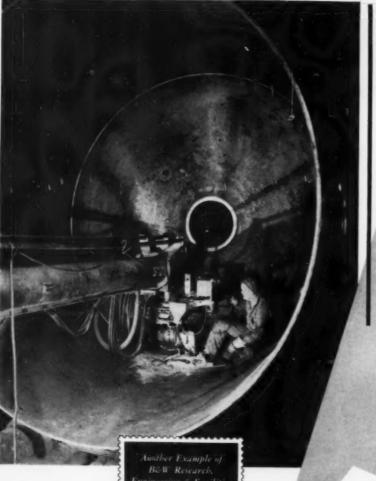
is the off deadorization of bodying only acid distillation with processing estarification pishalic aninythide tester oil dehydration ulphuric acid concentration analysis heating and regeneration hypersorphism.

When making an installation of a Dowthern heated process system in your plant, it is executed that all heating-equipment and interconnecting piping, as well as the Dowthern vaporater, be properly designed and furnished by a manufacturer with sufficient background in this type of work to know the special problems involved. In 1932 Foster Wheeler Corporation, builders of heat exchangers and direct fixed boilers and heaters for the past 50 years, was the first manufacturer to design, engineer, and construct a complete Dowthern heated process system Since that time, Foster Wheeler has installed more than 300 yapparentors and—in most cases—has supplied and engineered the intitle systems. Some of these installations include Dowtherm vaporaters with capacities up to 35,000,000 bts.

FOSTER WHEELER CORPORATION

PARTER WHEFTED

this Plus Value



equipmen

5-4091

118

February 1952—CHEMICAL ENGINEERING



Illustrated at left a typical example of the evanced welding practices employed at B&W for the fabrication of pressure vessels. B&W's history of resource-ful engineering is distinguished by a 25-year-old succession of developments and improvements in welding machines, automatic controls, techniques, coating of electrodes, inspections, and tests.

B&W's leadership in welding—beginning in 1930 with the first welded boiler drum approved by an engineering authority for high-pressure operation—is being applied to an ever-broadening range of quality-welded vessels for high and low temperatures and pressures, and for corrosive services. Chances

are B&W has the economical solution to your process equipment problems. The Babcock & Wilcox Company, 85 Liberty Street, New York 6, N. Y.





"Model" Grease Plant FOR GANADIAN OIL COMPANIES, LTD.

This lucite, scale model was the "blueprint" used by Fluor engineers to plan and construct the new modern lubricating oil and grease manufacturing plant for Canadian Oil Companies, Ltd., in Montreal. Being able to work out detailed designs in miniature, played a big part in the successful selection and location of all equipment to facilitate the natural flow of work through the plant with a significant saving in man hours. It is an example of the thoroughness with which Fluor tackles a job.

Over 300 varieties of specially engineered greases and lubricants packed in a multitude of sizes, from 3 ounce cans to 55 gallon drums, are manufactured, blended, packaged and stored in this efficient plant. It had to be built in a U-shape to incorporate the original plant which still houses much of the blending machinery. It had to be accessible to all forms of transportation by land or water. It had to provide storage facilities for raw grease stocks before processing and for interior storage of finished products. It had to be equipped with the latest automatic devices for heating, blending, sterilizing, conveying, packaging, handling, etc. and it had to be completed in the shortest time possible.

Fluor's experience with building and remodeling plants which use bulk materials for a variety of products, has long been established, but at Canadian Oil much of the machinery is Fluor designed—especially that used for handling materials. The flexibility of this equipment is almost human in its ability to switch from one type of product to another, from one type of container to another and from one type of carrier to another whether it be truck, box car, tank car, freighter or tanker, without loss of time for change-over.



FLUOR

Fluor's Engineering and Construction Division is one of the nation's foremost organizations in plant construction, from design to completion. For more information contact your nearest Fluor district office or representative.

BE SURE WITH PLUOR



DESIGNERS AND CONSTRUCTORS of Refining, Natural Gas and Chemical Processing Planta.

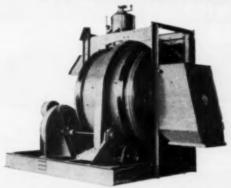
MANUFACTURERS of Pulsation Dampeners, Mufflers, Gas Cleaners, Cooling Towers and Fin-Fan Units.

THE FLUOR CORPORATION, LTD., 2500 S. Atlantic Blvd., Los Angeles 22. California
New York, Chicago, Pittaburgh, Boston, Thina, Houston, San Francisco, Birmingham and Calgary.

BEPRESENTED IN THE STRELING AREAS BY: Head Wrightson Processes Ltd., Teesdale House, Baltic Street, London, E.C.I., England



He can't stand that slow mixing cycle!



A Worthington Chemical Mixes, a unique machine incorporating all the features and advantages brought about during nearly a century of experience in designing and building mixers for all purposes. Chemical mixers equipped with measuring tank for use in various chemical applications. Standard sizes to 110 cu ft or 3 tons per batch.



Hold it, bud. There's an easier way out! We've got a mixer than can boost your daily output as much as 10 per cent. It's the Worthington chemical mixer with engineered blade design—a mixing action that's faster than any we know of. It saves time with every batch, mixes thoroughly, and eliminates these other big problems as well:

THE CORRODED DISCHARGE CHUTE—The Worthington discharge chute is out of the mixer during mixing time. Proper balance makes manual control of chute easy. Pneumatic controls also available.

THE WOBBLY DRUM ROLLER—Worthington drum rollers are of genuine carwheel metal, ground to exact diameter. Compensation for wear to permit perfect centering is accomplished by easy adjustment of drum-roller shafts.

THE HEAVY HORSEPOWER CONSUMER—Worthington's clean, anti-friction construction with specially designed parts assures minimum possible horsepower consumption.

YR.2.4

	END THIS COUPON TODAY to learn more about how to reduce mixin ime with a Worthington chemical mixer.
1	Vorthington Pump and Machinery Corporation ndustrial Miner Division Junellau, New Jersey
	AMI,
	озтон
	Joonts
•	377STATESTATE

SMART DECISION!

AIR CONDITIONING COILS



WATER COIL
For Cooling and Heating, 1 to 10
rows deep.



CLEANABLE TUBE WATER COIL Removable Plug Type, 1 to 10 rows deep.



DIRECT EXPANSION COIL For Cooling, 1 to 8 rows deep.

AIR CONDITIONING UNITS



CEASONMAKER—(FLOOR)
Also available in basic or ceiling types, 3 sizes 200 cfm, 400 cfm and 600 cfm.



"RH" AIR CONDITIONER 2 to 10 Ton Models—For use with hot or cold water, steam or direct expansion in small commercial applications.



(SUSPENDED MODEL)

AIR CONDITIONER

Type "A" Central Station Air Conditioners for large industrial and commercial applications.

UNIT HEATERS



HORIZONTAL UNIT HEATER Nominal Capacity range 20,300 to 360,000 Btu's.



DOWN FLOW UNIT HEATER Nominal Capacities from 25,400 to 500,000 Btu's.



(SUSPENDED MODEL)
BLOWER TYPE UNIT HEATER
Nominal Capacities from 20,600
to 1,600,000 Btu's.



TO INSURE CUSTOMER SATISFACTION



"BLAST" HEATING STEAM COIL For Heating, 1 or 2 rows deep, using low or high pressure steam.



AIR CONDITIONER

Type "A" Central Station Air Conditioners for lärge industrial and commercial applications.



BLOWER TYPE UNIT HEATER Nominal Capacities from 20,600 to 1,600,000 Btu's.

Proved and Preferred!

You, and your customers too, are money ahead when you specify McQuay... because McQuay products are proved and preferred—for their efficiency, economy of operation, and the way they stand up under long hard use.

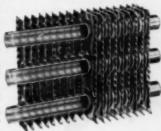
Join the growing list of architects, engineers and contractors who depend upon McQuay to satisfy all of their heating and air conditioning requirements. Quality and price comparisons will convince you that it pays to specify from McQuay's complete line—pays in profits from the job and in customer satisfaction.

NEW RIPPLE-FIN COIL CONSTRUCTION

Only McQuay gives you Ripple-Fin surface—the product of years of research aimed at producing the ultimate in heat transfer for any weight of metal. High efficiency is assured by forcing the air to follow an ever-changing direction of flow in passing through the coil. Thus air repeatedly contacts coil surface to give maximum contact time, maximum contact time, maximum contact octicity, and a resultant optimum heat transfer.

With this advance in design.

With this advance in design, McQuay retains the staggered tube and the McQuay rippled edge features so well known in the industry, and which contribute greatly to higher heat transfer, construction ruggedness, and eye appeal.



M. Quay INC.

HEATING AIR CONDITIONING REFRIGERATION



1622 BROADWAY STREET, N.E. . MINNEAPOLIS 13, MINNESOTA



You're looking at \$2,000,000 worth of Armourdeveloped Adrenocorticotropic Hormone miracle drug, popularly known as ACTHAR. The "bank" is a transparent p-k Twin Shell Dry Blender.

Blending is the last of twenty operations which Armour performs on the pea-sized anterior lobes of hog pituitaries. To insure exact day-to-day uniformity of product characteristics, a "bank" of about \$2,000,000 worth of ACTHAR is kept

in the Twin Shell Blender at all times. To this is added each day's production. The contents are thoroughly blended. Shipments are taken from the blended mix.

This special p-k Twin Shell Dry Blender was engineered to meet Armour's exacting specifications. It is dust-tight, gentle, non-contaminating, and the finished blend is absolutely uniform.

WORTH OF ACTHAR



p& Twin Shell Dry Blenders of transparent plastic are available in 1, 2, and 3 cu. ft. capacity. Sizes range up to 250 cu. ft. capacity in steel and other metals.

For full particulars on both the laboratory and production models, write for Catalogs 401 and 402.



29 Lackawanna Ave. East

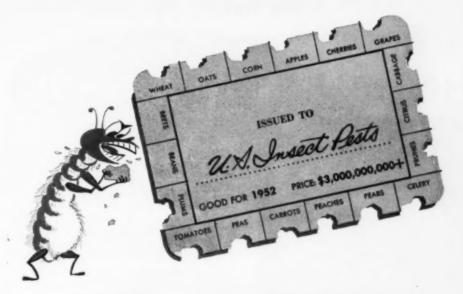
East Stroudsburg, Penna.

1108

181 Park Avenue, New York 17 * Reilway Exchange Building, Chicage 4 * 1700 Walnut Street, Philadelphia 3 * 96-A Muntington Avenue, Baston 16 * und other principal cities

Simply Designed

Better Blending



Billion Dollar Meal Ticket

YOU'D probably be startled to read a full report on this nation's annual crop losses due to insect pests. Corn borers alone, for example, destroyed over \$100,000,000 worth of corn in a single year. The nation's total loss to insects—and it's a loss that's felt right down to your dinner table—is estimated at between three and five billion dollars for last year!

But there is a brighter side to the picture: This great plunder of the nation's larder is being steadily reduced each year, thanks to the chemical insecticides, weed killers and brush killers that are constantly being developed and improved for the American farmer. With just a few pounds of these amazing chemicals, he can free an entire acre of destructive insects or weeds . . . safely, quickly and inexpensively.

As a basic producer of such coal derived farm chemicals as DDT and Parathion insecticides and 2,4-D weed killers, the Pittsburgh Agricultural Chemical Company is proud to be a leader in the nation's progressive agricultural chemical industry.

The same step-to-step production control which makes *Pittsburgh* synonymous with high quality in agricultural chemicals also assures American industry of reliability when it uses the coal-derived products of our other integrated divisions.

PITTSBURGH AGRICULTURAL CHEMICAL COMPANY

EMPIRE STATE BUILDING, NEW YORK 1, N. Y.

- * Organic Insecticides
- Organic Phosphate Insecticides
- * Weed and Brush Killers
- * Cotton Sprays and Dusts
- * Special Agricultural Chemicals



COAL CHEMICALS . AGRICULTURAL CHEMICALS . PROTECTIVE COATINGS . PLASTICIZERS . ACTIVATED CARBON . COKE . CEMENT . PIO IRON

No stuffing box troubles in

HAGAN

RING BALANCE METERS



because there are no stuffing boxes!

Forget about stuffing box troubles and pressure tight bearings when you install Hagan Ring Balance Meters. The simple, flexible S-tube connections to the ring assure dependable accuracy and trouble-free operation.

Features of the Hagan Ring Balance Meter include:

Calibration can be checked under operating conditions by checkweight method

Excellent response at extremely low flow rates

Mercury level not critical

Full-scale chart differential is adjustable over a 7-to-1 range

HAGAN CORPORATION

HAGAN BUILDING
PITTSBURGH 30, PENNSYLVANIA

Our engineers will be glad to show you how Hagan Ring Balance Meters can help solve your metering problems. Use the coupon, or write to Hagan Corporation, Hagan Building, Pittsburgh 30, Pa.

Hagan Corporation Hagan Building • Pittsburgh 30, Pennsylvania
Please send me further information on Hagan Ring Balance Meters, I am particularly interested in
NAME
POSITION
COMPANY
STREET AND NUMBER
CITY ZONE

Here's An Easier, Better Way

TO ACCOMMODATE LINEAL EXPANSION AND CONTRACTION

TO ABSORB HIGH-FREQUENCY VIBRATION

Titeflex BELLOWS

TO OSTAIN SPECIFIC RECOMMENDATIONS

Our engineers will be glad to recommend types and sizes. Send us the following data: Pips sizes and materials; material conveyed; temperature, pressure and corresion condi-tions; expansion values; vibration rate and in-tensity; type of flanges, if any.





FLEXIBLE METAL HOSE SPECIALISTS FOR MORE THAN 30 YEARS

A STEAM TRAP CASTS A

BIG effects from little traps! And, the effects are multiplied by the number of traps in the plant you design or operate until they grow to be a mejor influence upon operating efficiency and economy. Before you specify steam traps ask your nearby Armstrong Representative to call. He is qualified to give you practical assistance and answers that can save you a lot of time and trouble.

THINGS STEAM TRAPS AFFECT

- 1. HEAT-UP OR START-UP TIME
- 2. RATE OF PRODUCTION
- 3. STEAM WASTE
- 4. FUEL WASTE
- 5. CONTINUITY OF OPERATION
- 6. MAINTENANCE COST



Cour comi-chest size into side curtar series. V/", ki" and I" place assessitions. Cast consisted bottom in round and series for let - top surfact varies. We', presented to 1500 part through 2" place connect for low and head this wide.

It Pays to Specify



ARMSTRONG MACHINE WORKS

838 Maple St., Three Rivers, Michigan

ARMSTRONG

MIGHTY BIG SHADOW

REASON

HOW ARMSTRONG TRAPS MEET THE NEED

EXAMPLE

When steam is turned on, large amounts of condensate and air must be removed before equipment heats up.

Condensate and air removed as fast as they reach trap. Reliable data insures you get trap with adequate safety factor to meet conditions.

40 Minute Faster Heat-up-drying oven at pharmaceutical plant heats up 40 minutes sooner with Armstrong "Blast" traps.

Quick heat-up, maximum temperatures essential for maximum output.

Air which reduces temperature and heat transfer discharged automatically; condensate discharged at steam temperature; equipment kept full of hot, dry steam.

When steam floats the bucket

the trap closes. No steam ever

30% Greater Output - jacketed kettles produce 30% more at Canadian plant since changing to Armstrong traps.

When steam gets past traps, boiler capacity may be inade-quate—this is bad even if you could afford the fuel waste.

reaches discharge orifice, even when there is no condensate load. Heat treated chrome steel valve parts, precision ground and lapped, resist wire drawing Why burn fuel to generate steam and wear, stay leak tight for a long, long time.

Steam Savings Eliminate Need for New Boiler-chemical plant shelves plans to buy larger boiler after installing Armstrong

that does no useful work . . . blows through traps, for example?

331/196 Reduction in Fuel Bill after trapping vats with Armstrongs at Missouri plant.

When traps are inoperative or down for repairs, unit being drained may be "off the line."

Nothing to clog, seize, stick or collapse! Large orifice. Selfscrubbing action cleans out ordinary dirt and scale. "Frictionless" leverage with wear points heavily reinforced for long life. Hardened chrome steel valve and seat. Wear and corrosionresistant stainless trim.

Maintenance Time Cut 30% -Illinois user says, "Unequalled dependability, simplicity of design means repairs can be made quickly" (with minimum equipment downtime).

Traps that don't "wear well" take a lot of manhours for repair.

50% Less Trap Maintenance only half as many manhours devoted to traps since installing Armstrongs throughout large Midwestern plant.

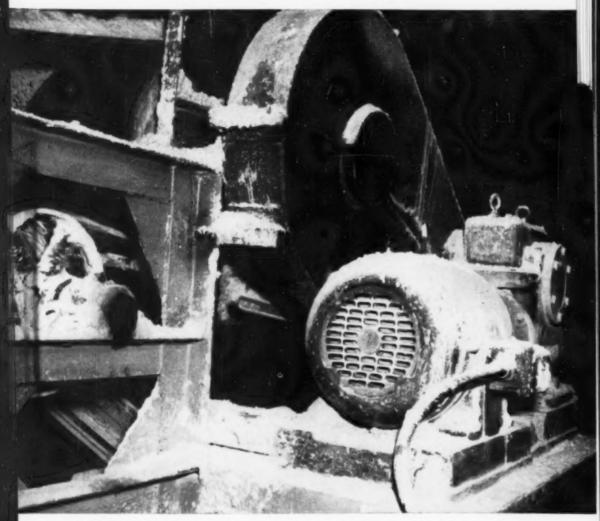
SEND FOR THE NEW ARMSTRONG STEAM TRAP BOOK

Fresh off the press — 44 pages of practical trapping data. Tells how to select traps for nearly every class of equipment; explains safety factors; gives prices, physical data, service pressure ratings of Armstrong traps; includes recommended installation, mainte-

nance and trouble-shooting practice; contains many time-saving charts and tables — con-densing rates, trap capacities, trap size recom-mendations and others. For your free copy, call your local Armstrong Representative or write to Armstrong.



INDUSTRY DOES THE



THE CHEMICAL INDUSTRY depends on standard, "off the shelf," Tri-Clad motors in the most adverse operating conditions, including corrosive, abrasive and explosive

atmospheres. The $7\frac{1}{2}$ -hp totally-enclosed fan-cooled Tri-Clad motor above drives a crude ash conveyor an average of over 23 hours every day.

GENERAL



ELECTRIC

TOUGH JOBS WITH

TRI CLAD MOTORS

EXTRA PROTECTION

Every Tri-Clad motor, open or totally-enclosed, is triplyprotected against physical damage, electrical breakdown and operating wear and tear.

That's why you'll find general-purpose Tri-Clad motors in every industry—not only on the usual jobs which they do so economically—but on the *tough* jobs where unfailing performance is a must.

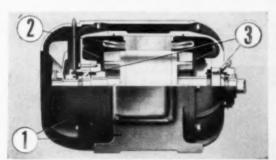
PROMPT DELIVERY

Today especially, delivery and service are important. G-E shipping points all over the country are ready to deliver most standard ratings right out of stock. And with the most complete service shop network in the motor industry you are assured of the best attention to motor problems.

TIMELY INFORMATION AVAILABLE

If you are concerned with training manpower, the new G-E Motor Selection and Application Course, including nine strip films, is a unique and valuable aid. A sample copy of the "Instructor's Manual" (GEZ-310), which outlines the course, may be obtained on request.

Also available is a free bulletin on "How to Maintain Motors and Generators" (GET-1202). Contact your local G-E sales office for any of the above material, or write Section 752-12, General Electric Co., Schenectady 5, N. Y.



UNINTERRUPTED SERVICE under tough conditions is assured by many outstanding features of Tri-Clad totally-enclosed motors, for exacupte: "tiglid, cast-iron end shields and frame; 2 Formex" windings which resist oil, heat, shock, moisture, abrasion; 3 completely enclosed bearings that will last longer because provision is made for refubrication if necessary.

Re, Indiamed, Girmust Elizars Co.



FOOD PLANTS on "continuous process" operation depend on Tri-Clad motors to avoid costly shut-downs, Totally-enclosed, non-ventilated Tri-Clad gear-motor above drives a repulper in a sugar refinery.



MINING INDUSTRIES know Tri-Clad motors can take abuse, don't twist out of line and are corrosion-resistant. This totally-enclosed, fan-cooled, Tri-Clad motor runs a coal conveyor.



METAL WORKING FIELD likes Tri-Clad motors because they're easy to mount in any position, rigid and smooth running, and can be relubricated if operating conditions warrant—without disassembly! Six 7½-hp TEFC Tri-Clad motors run machine above which polishes, 300 to 1000 metal coffee-makers per hour!

NOT A COATING ...

Solid

Porcelain

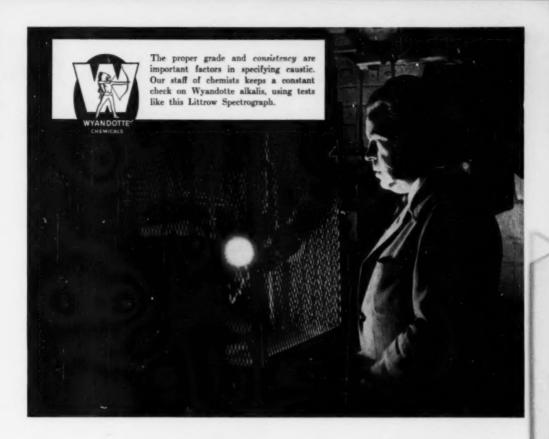
NON-POROUS THROUGH-AND-THROUGH

The dependability and long life of the Lapp Valve is due to its sound design, and to the fact that it is made of porcelain . . . body, plug and packing rings. Not a coating or enamel, porcelain is a dense, homogeneous, thoroughly-vitrified ceramic, non-porous, through-and-through acid resisting. Not even is the corrosion-resist-

ance of this material due to a glaze. In fact the "working parts" have no glaze. The smooth operation and pressure-tight seal characteristic of Lapp Valves result from precision-tolerance machining... grinding and lapping of solid porcelain to a mirror-like smoothness.

Valves and other equipment of Lapp Chemical Porcelain may be the answer to your corrosion problems. Write for literature. Lapp Insulator Company, Inc., Process Equipment Division, 493 Maple St., LeRoy, N.Y.





These tests PROVE THE CONSISTENCY of every grade of Wyandotte Caustic!

Complete analyses of Wyandotte alkalis (read how you can make them) assure you of consistency and other advantages.

Among the many grades of Wyandotte Caustic Soda, you'll find the grades best suited to your needs... for soaps and detergents; food processing; paint, inks, and dyes; for insecticides, textiles, and lubricants.

Wyandotte Mercury Cell Caustic, for instance, meets the most exacting specifications. It's as pure as reagent grades! One manufacturer used to purify caustic in his plant - now uses Mercury Cell, eliminating the need for purification!

Complete alkali line

For caustic soda, soda ash, and bicarbonate of soda, for chlorine and calcium chloride, you'll find Wyandotte a reliable and helpful source.

Our experienced staff of chemists is at your service for technical help. As a service to you, they have collected into a handy booklet the analysis procedure (mentioned above) for caustic, soda ash, and bicarb. A copy is yours for the asking. Why not write for it?—or for product data or technical help? Wyandotte Chemicals Corporation, Wyandotte, Michigan. Offices in Principal Cities.



Now, from Honeywell...a flow



Wherever supervision of your plant processes requires flow measurement, Honeywell has the right instrumentation for the job.

Included are instruments specifically designed for accurate metering and flow cost-accounting of process fluids, with either linear or square root scales and continuous integration . . . with a choice of electric or pneumatic transmission from the metering point.

Flow-measuring systems, including proper control, are patterned to your exact requirements

. . . offer you the advantages of Honeywell's single responsibility from sensing element to control valve. Each part of the system is designed and built with the needs of process designers, production engineers and instrument men foremost in mind.

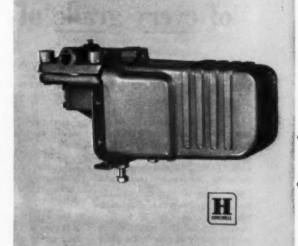
Call in our local engineering representative for a discussion of your application . . . he is as near as your phone.

MINNEAPOLIS-HONEYWELL REGULATOR Co., Industrial Division, 4478 Wayne Ave., Philadelphia 44, Penna.

BROWN DIFFERENTIAL CONVERTER

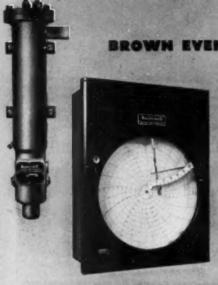
This new flow transmitter, based on the pneumatic balance principle, is setting high standards of precision and simplicity in field operation. Using no mercury, seals or strainers, it converts the pressure differential at the metering orifice into a proportionate air output pressure which is a measure of flow. Response is rapid and accurate. Range is continuously adjustable from 20 to 200 inches of water, and is easily changed in the field without special tools or extra parts. Applicable to either liquids or gases, the Differential Converter is easily installed, cleaned and calibrated in the field.

For graphic panels and other applications requiring compact instrumentation, the Differential Converter is part of a new Honeywell flow control family which includes Tel-O-Set Indicators, Recorders and Controllers. Write for "Centralized Instrumentation — Unlimited," a new brochure describing types of Brown panelboards and instrument components available for industry.



Omportant Reference Data . . . Write for Catalog No. 2281 on the Billereatial Convertor . .

meter for every requirement



YENLY GRADUATED FLOW METER

Features linear scale and electronic integration for simplified flow accounting...eliminates intermittent measurement and slow, complicated totalizing. Electronic integrator is simple, accurate, easily accessible for calibration and inspection. Precision-made meter body utilizes electric transmission for fast, sensitive remote recording. Also available with integral meter body (mechanical type). Characterized corrosion-resistant bell automatically provides straight-line flow measurement.

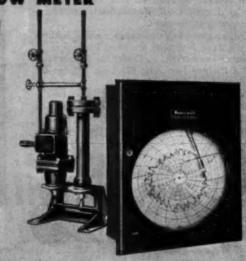
BROWN SQUARE ROOT FLOW METER

Costs for the distribution and utilization of fluids can be accurately determined with this instrument...available as a mechanical meter (with integral meter body) or as an electric meter (with electric transmission from remote meter body). Now equipped with electronic integration, it is available with a variety of meter bodies...including types for low pressure, intermediate pressure and all-purpose; as well as sealed armature and area types for special fluids. Interchangeable range tubes afford broad flexibility in the field.

Honeywell

BROWN INSTRUMENTS

First in Controls



Catalog No. 283-1 on the Evenly Graduated Flow Meter ... Catalog No. 2822 on the Square Root Flow Meter.

NOW STANDARDIZED

3 Precision Controls for All Speed Problems

Here's governor standardization that "pays off". Now you can economically solve all speed-control problems with only three basic governors.

Costly special engineering is eliminated. Advanced design gives an unusual degree of flexibility... with precise speed control for all steam conditions. Results? Initial costs are lower... shipments are quicker... spare-parts inventory is reduced.

Designs for three basic classes of steam conditions, three wheel sizes, and three types of governors provide, in effect, twenty-seven standard variations to cover a wide range of applications. All oil-governed, direct-connected Type E units include the standard reservoir-type base as illustrated. What's more, Type E governors can meet a great number of special requirements with optional accessories. This standardization results directly from Westinghouse's wide experience in all industry.

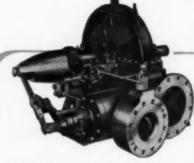
Other outstanding maintenance-saving features on the Type E turbine are Dual Protection...

Weather Protection... Centerline Support...
and a Rugged Governor Housing. Ratings are available from 5 to 1,500 hp.

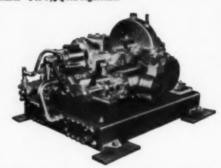
For complete information ask your nearby Westinghouse representative for Type E Turbine Book B-3896, or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa.

Westinghouse

TYPEE Turbines



Shaft-Type Governor. For narrow speed-range applications, this governor automatically positions the steam admission valve to control turbine speed within close limits—6 to 8% speed regulation.



Hydraulle-Orllies Gaverner. For wide speed-range applications such as drives for fans, blowers, and compressors —3-to-I speed-adjustment range; 6% speed regulation.



Vertical Oil-Relay Governor. For narrow-range precisioncontrol applications such as drives for generators, pumps, blowers and compressors—331/% speed-adjustment range; 4% speed regulation.

J-90927

LINK-BELT engineering experience...



GYPSUM ROCK is carried at rate of 500 tph from ship's side to open yard storage by 30-inch Link-Belt Belt Conveyors.



JUNCTION OF Link-Belt Belt Conveyors, showing rubber-tread impact idlers at loading points and welded steel foot pulleys.

Plus LINK-BELT quality components...

M

SERIES 100 TROUGHED BELT IDLERS. Strong, balanced integral rolls revolve on high-grade roller bearings, Greasein, dirt-out seal, large reservoir preserve lubricant.



RUBBER-TREAD IMPACT IDLER for loading points protects the belt by absorbing the shock of heavy materials or lumps delivered from above.



BELT-TRAINING IDLER for automatic belt positioning. The actuating rolls respond to slightest contact — quickly recede and center the belt to minimize wear.

BELT CONVEYORS

WHAT'S your materials handling problem? Tonnage, distance or a combination of the two? Heavy or light materials? Large lumps or fines? Continuous or intermittent operation?

Whatever the conditions, you'll find the right answers at Link-Belt. For Link-Belt designs conveyor systems to meet your requirements. Backed by unmatched materials handling and power transmission experience, our conveyor specialists help you and your consultants get the right equipment in the right place.

One Source-One Responsibility

Link-Belt makes all the various elements—all types and sizes of idlers, takeups, pulleys, trippers, bearings and power transmission drives. Plus all related equipment—other types of conveyors, feeders, elevators, car dumpers and shakers.

And Link-Belt will build your supporting structures and enclosures . . . install the job completely. One source — one responsibility. Every detail receives the proper attention to assure you an efficient, trouble-free, long-life conveying system.

The next time you need belt conveyor engineering assistance, call the Link-Belt specialist in our office near you.



BELT CONVEYOR EQUIPMENT

LINK-BELT COMPANY: Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Houston 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8, Springs (South Africa). Offices in principal cities.



MFRS. OF CHEMICAL PROCESSING EQUIPMENT, VENTILATING FANS, STACK FANS, AXIAL BLOWERS, BRICK, TILE, POTTERY AND CERAMIC MACHINERY

Memo from the Editor John R. Collabam

How We Pick Our Articles

As a reader—or maybe as an author—you've probably wondered how we decide whether or not to publish a particular manuscript. Well, our system is based pretty much on these key questions:

- Is it in the field of applied chemical engineering?
- · Does it give information that's new or useful?
- · Will it interest a broad segment of engineers?
- · Is it brief, direct and to the point?

Each year we get several hundred manuscripts submitted as feature articles or reports for Chemical Engineering. Most of them are good, many are excellent.

Yet we accept, on the average, only about 40-50 percent of them. Why, you may ask, and how do we go about picking those we do publish?

► Is It in Our Field?—This is the first and usually the easiest—question to be answered. And it's based on one of our guiding principles:

It doesn't do anybody—the reader, the publication and especially the author—any good to have an article appear where it doesn't belong or where it won't reach the greatest number of people interested in the subject or particular approach to that subject.

Since our field is chemical engineering, we naturally have to turn down many good manuscripts that aren't in that field. This includes most of those that deal with chemistry, laboratory procedures, metallurgy, food technology and the like.

But there's another key word in that first question; it's the word "applied." In other words, does the manuscript give information that's in the field of applied chemical engineering?

Practically all of our readers are in industry or consulting work with industry. And most of them have jobs that require them to put their engineering knowledge to good use in solving every-day problems.

That's why we stress the applied, practical, know-how, dollars-and-cents, can-it-be-used-call it whatever you please-type of information.

Our insistence on this practical approach forces us to reject excellent manuscripts that deal with the more theoretical, historical or experimental aspects of chemistry and chemical engineering. There are first-class publi-

cations where such articles are published and we never hesistate to recommend them.

On occasion, I'll admit, we do publish an article outside this broad field of "applied" chemical engineering—but only if we're convinced that it has unusual value or interest to our chemical engineer readers.

▶ Is It New or Useful?—This question isn't always easy to answer. Sometimes we have some pretty hot arguments among ourselves and we often ask the advice of outside authorities. At times we go back to the author and ask him to prove these points.

One of the first things we do, of course, is to find out what's been published recently along the same lines. If the same subject and approach have been pretty well covered in other published articles, we naturally don't like to duplicate them.

In many cases, we go back to the author and suggest that he change the slant or extend his treatment along lines that haven't been covered. Most of them are glad to do it and come up with articles that fill a definite need.

Our readers tell us that well-done review articles or reports are particularly valuable. Although these don't always give new information, they can be very useful in bringing together, correlating and interpreting a lot of scattered data. Our questions here are: Is the information brought up to date? Is it correlated and interpreted? Has the same job been done before—and how recently?

So, whether the information is new or not, we do insist that it be slanted for the use of practicing chemical engineers. That's one of our basic yardsticks, and always will be.

► Does It Have Broad Interest?—Some manuscripts pass the first two questions but are turned down by this one.

Let me explain a bit by asking you a question.

Suppose we published a 6-7 page feature article describing in detail how one particular manufacturer has been making chrome yellow. Would you be interested enough to read it through? Unless you're in the business of making chrome yellow—and not more than a dozen or so chemical engineers are—chances are you'd glance at it and go on.

An article like that would be too specialized to interest many engineers outside the immediate narrow field. But a 1-2 page technical news item would do the trick in telling engineers outside that business what's new and newsworthy about chrome yellow and broadly how it's made. Besides, chances are it would do a better job of what one reader has called "cross fertilization of ideas."

This philosophy of ours—and it's a philosophy that we arrived at by studying your reading habits—explains why we usually publish process descriptions as short technical news items (in our regular Chemical Engineering News Department) rather than as long articles. More people read them.

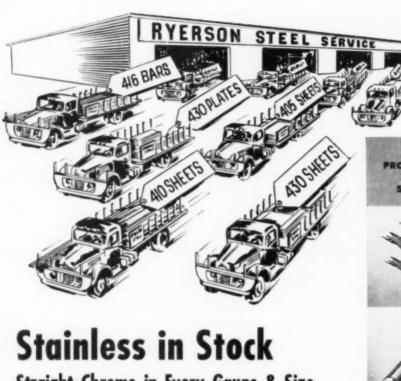
Now another question: Suppose we published a 12-15 page feature report on pumps (as we will next month) or adsorption or instrumentation. Would you read it? We believe most of you would. For these are basic, commondenominator subjects—unlike chrome yellow—that pretty much hit at all chemical engineers regardless of what industry or jobs they're in.

The same principles hold, more or less, for shorter feature articles. And that's why we ask the question, Will it interest a broad segment of engineers? Our object is to have more articles that'll be of interest and value to more readers.

► Is It Short?—With the exception of our monthly feature reports or special issues, most of our articles are fairly short. They seldom run to more than four pages.

The reason is this: most engineers are more apt to read a short article than a long one. And it's easier to get the meat out of a short article, too, since the excess verbiage has been pared off.

There are, of course, exceptions—subjects that simply cannot be treated, and treated properly, in a few pages. But we do insist that each article be as brief and pointed as proper treatment will permit. (Continued on p. 284)



Straight Chrome in Every Gauge & Size

As stainless users switch to straight chrome types, Ryerson is ready for them. Ready with the nation's largest and most diversified stocks of straight chrome stainless steels.

Our stocks are large because we began building them months ago when it first became evident that the use of nickel would be restricted. As a result, you can maintain your stainless production now, despite restrictions, by calling Ryerson.

All the straight chrome steels shown on the tags above are on hand in a wide range of gauges and sizes. So we are in a good position to handle almost any requirement. And all are time-tested Allegheny stainless steels of definitely established performance.

If you are looking for a metal to replace nickel-bearing steels, we urge you to consult our stainless specialists. Then draw on our large stocks of straight chrome types. A special technical bulletin on chrome stainless alternates for various applications of 18-8 stainless has just been published. Write for your copy.

Warehouse Distributor of Allegheny Stainless in All Types, Shapes and Sixes

RYERSON STEEL

JOSEPH T. RYERSON & SON, INC. STEEL-SERVICE PLANTS AT: NEW YORK . BOSTON PHILADELPHIA . DETROIT . CINCINNATI . CLEVELAND . PITTSBURGH . BUFFALO . CHICAGO MILWAUKEE . ST. LOUIS . LOS ANGELES . SAN FRANCISCO . SPOKANE . SEATTLE



Chemical Engineering

How High Is High?

When we asked our economic advisors to pin down last month's rather optimistic predictions for business in 1952, here are their answers:

▶ Business as a whole, measured in physical terms will rise 4 or 5 per cent before 1952 is over.

▶ Output in manufacturing and mining (industrial production) may rise as much as 7 or 8 per cent during the year.

▶ Most of the rise will be in defense industries, in textiles and other recently depressed consumer-goods industries.

▶ The capital-goods boom will continue well into 1952 but might taper off toward the end of the year as we pass the peak of industrial plant and equipment installations.

▶ The general price level will not rise much during the year—probably not more than 2 or 3 percent.

Just how does this apply to that rapidly growing segment of American business we call the chemical process industries? You'll find our best thinking and conclusions in the 48-page report that features CE's 29th annual economic and technological review.

Spoken Like a Statesman

When another chemical company challenged the propriety and the legality of a grant by the Army to Mathieson Chemical Co. of a lease on Morgantown Ordnance Works, it looked like the beginning of a mud-slinging contest in which all sorts of cheap politics would find a place. Fortunately, this did not happen. We have Representative Carl Vinson to thank for the dignified and constructive manner in which his Committee on Armed Services handled the situation.

Any chemical executive who deals with Washington, (and who doesn't?) will read with profit the letter by which this Congressman reviewed the situation for his colleagues on the Committee. It is too long for inclusion here, but the following excerpts give a hint at its forthright character:

"At the outset let me say that the most important consideration for the Government at this time is to activate Morgantown Ordanace Works and get it into the production of nitrogen products. . . . The Department of Agriculture . . . is not concerned with who gets a lease, but it is concerned with a shortage of over 500,000 tons of fertilizer annually and the prospective increase in that shortage. Morgantown's product would not overcome the shortage, but it would relieve it by 180,000 tons.* • •

"As I see it, it is our duty in this instance to see to it (1) that this plant is put into operation and (2) that the terms proposed are adequate and that they sufficiently protect the Government both as to the yield and to the objective for which the lease is made. We are not required to conduct an auction of public property. But if there are irregularities or if there is discrimination we must ascertain that and act accordingly. That is what we have done in this case. . . We have given all interested parties a full opportunity of presenting all of the facts to us.

"Most of the difficulties which were presented to the Committee could have been avoided by the Army. The invitation to sealed bidding was a misstatement. We should have been told that there was an existing contract with Mathieson for rehabilitation to be merged with the lease on or before December 20. The summary of the lease was inaccurate and incomplete. But the committee staff has unearthed all of the evidence which the committee requires for a full consideration of this matter and all of the parties have presented everything at their command and we are now ready for a decision. The misfortunes and ineptness of the Army's presentation have not changed the Mathieson's lease. . . . I find no irregularities and no discrimination, merely injured feelings for which there is some justification, but not enough to set aside our previous approval of a contract which is in the interest of the Government."

Seldom have we seen such a judicial, dignified, and statesmanlike analysis of a situation affecting relations of government and industry. The statement pulls no punches. It strikes at bad judgment and bad taste. It is clear that some of the practices of the Department of the Army should not be repeated. The review goes to the root of the matter. It points out the way in which the public interest must be considered and can be served.

If industry as well as government takes to heart Mr. Vinson's admonitions, it will be a good thing for both. And as taxpayers we should not fail to commend and applaud such competent and courageous statesmanship.

Patent Incentives, Good and Bad

Uncle Sam hires many investigators whose researches often result in patentable inventions. This presents two kinds of problems, neither of which has ever been fully solved. One has to do with creating incentives for research workers to make constructive contributions to the work for which they are hired. The second is that of protecting the public against paying twice for such results without adoption of a procedure that would discourage industrialization as well as public-service use of these inventions.

The new Government Patents Board is working rather aggressively on the first of these problems. Chairman Archie Palmer is seeking to develop with the military and civilian agencies some sort of incentives which will lead to more productive research effort. That plan is excellent in its purpose. Wisely guided, it will do much more good than harm. But the encouragement of patentable invention by government workers leads also to difficulties, unless very carefully guided.

Lately we have had three examples of effort to pay inventors for their work on patents. In one case, the Atomic Energy Commission has made a monetary award of \$7,500 to a private inventor for developing "an apparatus and method useful in separating isotopes." This payment was partially reimbursement for expenses incurred on a project which, under the law, the government took from the inventor because it related to atomic energy matters. But the payment also included, probably wholly to good effect, a modest amount of reward beyond cost and wages to serve as an incentive for further work.

The other two cases are wholly vicious. They are instances in which Congressmen are seeking to get for their constituents substantial sums of money for inventors whose patents the government wishes to have in part for its own use. In each case these relief bills were for persons who had made their inventions while in the employ of the government, seemingly as a direct part of their assigned official duties. It certainly is questionable whether Uncle Sam is ever justified in paying twice for a man's services.

It is to be hoped that incentive for good research work can be found without creation of either double payment or the development of obstacles to industrial use of government results, which already belong to all taxpayers. If Dr. Palmer is able to steer between the two dangers and to develop an incentive system, he will deserve highest commendation and support. The patent system, however, must not be unduly distorted in an effort to stimulate government workers. The gain would be far less than the loss in such case.

Chemicals and Health

Factual information in the Food and Drug Administrator's annual reports and from the Delaney Committee witnesses has just been analyzed by Dr. John M. Foulger of Du Pont. His conclusions were reported to the very successful inter-industry conference on chemicals in foods sponsored by Manufacturing Chemists' Association in New York on January 15. Summarizing the total medical record, Dr. Foulger concluded that the present Food, Drug, and Cosmetic Act has protected American citizens against injury from chemicals in their foods. We agree.

Five incidents of acute poisoning by chemicals since 1930 have been cited before the Delaney Com-

mittee. These were the Jamaica ginger, elixir sulfanilimide, lithium chloride, monochloracetic acid, and diethyl stilbestrol cases. While there might be some debate as to Dr. Foulger's legal argument that only the monochloroacetic acid case involves a "chemicals in food" incident and that the other four cases were "drug" problems, only one known fatality can be attributed to a food additive in the three incidents which we think should be called "food" problems (ginger, acid, and stilbestrol).

In summarizing the FDA annual reports from 1939 to 1947, Dr. Foulger pointed out that no single death is known to have resulted from the use of chemicals in or on foods, when properly intended for such a purpose. When it is considered that in the same period accidental deaths in the home totalled 250,000, and an additional 250,000 people were killed by highway accidents, the statistical significance of food poisoning from the use of chemicals seems infinitesimally small.

Nor has repeated exposure to small quantities of chemicals entering our food shown any indication of hazard. Thousands of American workers in the chemical industry have had daily and hourly contact with the dust or fumes and vapors of thousands of new chemicals. Dr. Foulger speaks from intimate and extensive experience in the medical study of such chronic exposures in industry. We agree with him when he says "without equivocation, as a result of accumulating experience in the field of industrial medicine in the chemical industry, that the general public does not face the hazard of new or unexplained or undiagnosable diseases as the result of repeated intake of small quantities of chemicals which may be used in production, processing, or packaging of food."

The one area where it can be argued that the present law may need strengthening is in assuring that advance information be supplied by industry to FDA with respect to proposed new uses of chemical additives to foods. Once FDA knows of an intended use, and has evaluated it, existing legislation is adequate to enforce safety.

Closing note of the inter-industry conference was the proposal by MCA that such notification be given to FDA either by the chemical manufacturer or by a food processor proposing to use the chemical. This notice would include all toxicologic data available, as well as the known composition of the chemical additive, a method for its quantitative determination in the food, and directions for its proper use.

We may well be proud of the record of the chemical and food industries in this field. We believe that the relatively minor amendment to the FDC Act proposed last month would be reasonable. Chemicals have improved our health over past generations, in medicines, clothing, and shelter, as well as in foods. We see no reason now to make any more fundamental change in present industrial habits of advancing our knowledge of useful chemical applications.



The Battle for Production

Just as 1950 was the year of decision, 1951 and 1952 are the years of the battle for more production. But by 1953 the chemical industry will have to learn how to live with this thing called an arsenal economy.

The chemical industry now approaches the half-way mark of its battle for production, of its huge program of putting up the plants to turn out the chemical goods for an arsenal economy. For by the end of 1952, nearly-two thirds of the value of all chemical projects aided under the mobilization act will be up and ready to operate.

This chemical expansion is a vital part of the nation's broader program of building up a dual economy: a long-range economy of military preparedness atop a high-level economy of peacetime activity.

By this time next year this unprecedented target of guns and butter and plenty of both-will be doser to a reality.

As Defense Mobilizer Charles E. Wilson points out: "Never before on so vast a scale has any nation attempted to build military strength and at the same time expand its basic economy, maintain high levels of production of consumer goods, and

assist in the arming of allies throughout the world."

And never before has the chemical industry attempted to put up so many new facilities in so short a time or to turn out such a volume of products from its existing facilities. Its record of accomplishments during 1951—albeit spotty at times and often painful—is eloquent testimony to the virility of the industry and to the courage and vision of its leaders.

Putting Up the Plants

This year the emphasis will again be on putting up the plants, the same as during 1951. Into these two years, and at a cost that'll top \$2.7 billion, the chemical industry per se is compressing the greatest expansion program in its history.

The industry's planned capital outlay of almost \$1.5 billion this

Illustrated above and on our front cover is the expansion now under way at Monsanto's Texas City plant—an example of the industry's huge mobilization program.

year will be a 16 percent increase over the 1951 record. And the lion's share-some 78 percent-will go for expansion; the balance will be for modernizing its existing plants.

Other process industries are also up to their necks in expansions. Petroleum refining, for instance, expects to boost its capital spending in 1952 by a whopping 118 percent. The goal here is to up refining capacity from 7 million to 8 million barrels daily by the end of 1953.

Atop these expansions of the chemical process industries add those of the atomic energy program. Here the aim is to increase the investment in plants and facilities from the present \$2.5 billion to \$5 billion. And another \$6 billion is being considered!

As a result of this expansion, the nation's chemical capacity will soar. By the end of the year it will probably be up close to 12 percent over 1951 and will top by 2.5 times what it was in 1939.

Among the individual chemicals, the greatest emphasis on new capacity has been for such basic items as chlorine—from 2.1 million tons in 1951 to 3.4 million by 1954—ammonia, benzene, phenol and acetylene products.

By the end of 1954, the chemical industry will have a productive capacity that'll far overshadow what it was at the peak of World War II.

But by that time-barring an allout war-the big question might very will be: Is it too much too soon?

Catalyzing Technology

This rush to jack up output has naturally put the squeeze on many of the chemical industry's sources of raw materials.

And from this squeeze come changing technology and processes. Many of the technological advances of the past few years, in fact, have been motivated by the search for new, cheaper or more abundant raw materials. Sulphur, benzene, phenol—even uranium—are now definitely in that category.

Other process changes are being developed because the expansion surge is upsetting the delicate balance within an industry. Chlorine is becoming a case in hand; here the emphasis will be on new ways to get chlorine without caustic soda.

All in all, the past two years have brought in a host of process and technological advances. But many of these are actually developments of earlier years which were then economically marginal. A few represent changes—rather than advances—forced by necessity.

Industry's big danger (and it is a danger whose effects are treacherously delayed) is that the pressure to get things done now may cause basic research to be neglected. This is the type of research that gives rise to whole new technologies, industries and markets through creativeness rather than from necessity.

We are now reaping a rich technological harvest; what will it be a decade or so from now?

Mobilizing the Industry

The past year has also seen the nation put terrific energy into formulating and streamlining the mobilization procedures. Although the progress here has often seemed fumbling, the net result has actually been swift and striking.

One of the highlights of this mobilization effort has been the relative ease and effectiveness that have char-



SEPTEMBER 1950: Du Pont starts work on its Orlon staple plant at Camden, S. C

acterized the chemical direction from Washington. This has come, by and large, from the caliber of the men heading the chemical sections and from the cooperation of the industry itself.

This effort, however, has often been painful. Allocations, price regulations, wage controls, shortages of materials and manpower—as well as an all-time high in taxes—have all hurt.

Many of the industry's leaders are already thinking about basic problems that'll become more evident within the next few years: How long will it have government controls? Will they linger even after there is no longer a need for them? Will the chemical industry of the following decades be hamstrung—or coddled—by government planners?

History's record is not always a happy one; government controls, once put into effect, die hard. Thus the big question: Will the real direction of the chemical industry remain in the hands of Washington or return to the industry itself?

Getting the Brains

Steel has been short and many raw materials have been short; but the shortage that plagues the chemical industry most right now is that of technical personnel, especially chemical engineers.

This shortage of engineers for industry—now put at close to 60,000 for all types—is certainly one of the toughest to correct or bypass. By all the signs, it'll be with us for many years. By all the signs, it'll get much worse before it gets any better.

And that's where the great danger lies. For the nation's industrial might has come from the high level of productivity that technical brains have given it. The chemical industry's productivity—one of the highest of all industry—has stemmed from its engineers.

Now that these technical men are in short supply, and at the very time the industry is going through its biggest expansion in history, will productivity taper off? If it does, world communism may eventually develop an edge over the free world in the battle for production.

Even more basic is the cure, and this places a major challenge before the industry—a challenge that can only be tackled properly on a long-range basis.

Crux of the matter, in its simplest terms, is how to make the profession of chemical engineering more attractive, more satisfying, more rewarding. If the chemical industry or chemical engineering profession doesn't tackle the job, government or the unions might. At least one large eastern university has already been asked to sponsor a student chapter of one of the so-called "professional" labor unions!

Balancing the Supply

Chemical shortages were a mark of 1951; supply and demand were more often than not out of joint. Yet the year was characterized by new peaks in output—but peaks that couldn't reach the higher pinnacles of demand.

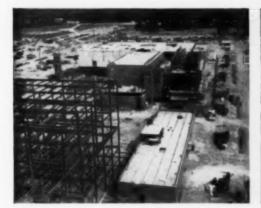
The year 1952 will set new records. The broad group of chemical process industries, for instance, expects to turn out a whopping \$57 billion worth of products—a 30 percent increase over the \$44 billion chalked up in 1950. This calls for more chemicals.



DECEMBER 1950



MARCH 1951



JUNE 1951



SEPTEMBER 1951

Last year's upset balance in chemical supply and demand was short but acute in some cases. In others—such as sulphur—it is chronic and full of widespread repercussions throughout our industrial economy. In practically all cases, it put an upward squeeze on chemical prices.

But for most items the worst will be over by the turn of next year. By then commodity competition will probably be with us again. And it will most likely be in full swing by 1955, maybe sooner.

An all-out war, of course, or a quickened mobilization program could throw the balance toward higher demands; a cut in business activity or a dragging mobilization could throw it toward over-supply.

Big questions the chemical industry will face by the beginning of next year: Will anything happen to throw this delicate supply-demand picture off balance before we learn how to live with this dual economy? Will normal demands rise fast enough to take up any slack that may develop from over-estimating mobilization needs?

Plowing Back the Cash

Last year was a record one for pretax profits; it was also a record for taxes. The result: 1951 chemical profits, after taxes, were down some 20 percent from 1950, based on ninemonth figures.

Some firms in the chemical process industries – notably petroleum and pharmaceuticals – fared better came out of the year with net gains over the previous year.

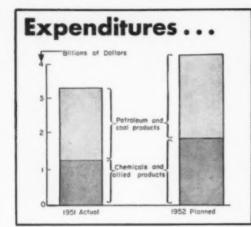
Although profits will probably remain at a generally high level, the industry's costs and expenses are going up. And the cost of new construction, which has gone up at a dizzy pace, is now 2.25 times the 1939 figure.

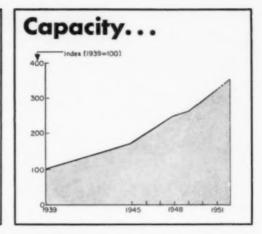
Cash assets for the chemical and allied industry dropped last year by about \$200 million, now stand at a little over \$1 billion.

This situation, if it develops into a trend, may well give industry leaders a basic problem to think about: How long can the industry bank on its retained earnings to finance the lion's share of its expansions and modernizations? Will the incentive to grow gradually weaken?

The U.S. chemical industry has been outstanding for its keen-edged aggressiveness and sharp incentives. Will continued high taxes, reduced earnings and government controls dull them? If so, relative stagnation will begin to creep into one of the nation's outstanding growth industries.

Such, then, are some of the questions and problems that usher in the second half of the chemical industry's battle for production.





No End to New Plants and Facilities

1952 investment in chemicals, petroleum and coal products, will be up 30 percent as compared with 13 percent for industry as a whole. Government assists will play a major role.

In 1952, \$4,279 million will be plunked down for expansion and modernization in chemicals, petroleum and coal products according to the fifth annual survey of business' plans for capital expenditures made by McGraw-Hill's department of economics. (Not included in this figure, of course, are expenditures for the atomic energy program.)

These planned capital outlays represent an amazing 30 percent increase over the 1951 record of \$3,300 million. Korea provided the spark. Continuation of the boom through 1952 reflects a further impact of the mobilization program—as well as the fact that these industries are long-term growth prospects.

GROWTH Uncle Sam Helps

Average growth rate for the chemical industry has been 10 percent per year over the period 1925-1950, compared with 3 percent for all industry for the same 25 years.

Government assists were a major stimulus last year, and they will continue to be so. These take the form of accelerated tax amortizations (most important), purchase and resale of vital materials, direct loans, loan guarantees, commitments to purchase at

specified floor prices, and government financing of part of the cost of exploration for minerals.

Dollar value of government-assisted projects in the chemical and petroleum industries is expected to rise from \$600 million of facilities already in place to \$1,200 million by the end of 1952, then to \$1,800 million by the end of 1953.

For chemicals alone we have a \$1,464 million planned expenditure in 1952 as compared with \$1,266 million spent in 1951. The survey shows that \$1,323 million, \$1,191 million and \$1,179 million will be invested in 1953, 1954 and 1955, respectively.

Petroleum refiners expect to boost capital spending in 1952 by a staggering 118 percent over the 1951 figure. The glass companies look forward to a 28 percent increase in plant and equipment expenditures this year. And rubber producers are preparing to embark on an expansion program that is up 44 percent as compared with the 1951 record.

In their response to the McGraw-Hill survey, chemical firms indicated that they planned to space their capital spending evenly over the course of this year. Present expectations are that 48 percent of the \$1,464 million will be spent during the first half of the

Chemical officials indicated that 78

percent of the capital spending would be devoted to an expansion of production facilities. That leaves the balance (22 percent) for modernization of existing plants and equipment. Industry as a whole will spend more (47 percent) for modernization. The higher rate of obsolescence in the chemical industry explains the higher proportion of capital spending required for expansion.

Reversing previous practice, chemical firms will resort to stock issues and debt capital to finance their expansion because they lack sufficient profits and reserves.

During the 1953-55 triennium, for example, 85 percent of the manufacturers expect to finance capital outlays entirely from profits and reserves; 9 percent expect to borrow; 6 percent expect to sell stock. But in the chemical segment the respective figures are 56 percent, 19 percent and 25 percent.

Capacity Will Be 357%

As a result of the expansion program in the industry, chemical capacity is certain to soar to new heights. McGraw-Hill department of economic's index of chemical capacity (1939 = 100) rose to 322 in December and is expected to hit 357 by the end of this year.

Industry as a whole is planning to spend \$21,175 million on plant and equipment during 1952. This is a boost of 13 percent over the peak level of \$18,779 million that was spent in 1951.

Petroleum and coal industries plan

an outlay of \$2,815 million in 1952. If these plans become reality it would mean a strapping increase of 38 percent over the 1951 figure in these industries.

Other sharp, steep increases in capital outlay during 1952 were indicated by business leaders in steel, electric manufacturing, transportation equipment and mining.

The really big decline in capital expenditures will come in the field

of textiles.

This industry has been plagued by lagging sales for many months. And since considerable productive capacity exists, the decision to cut spending by 41 percent in 1952 does not come as a surprise.

There is good reason to believe that industry as a whole will be able to meet the goals it has set. And spending by chemical firms is not likely to

lag behind the target.

Will Shortages Interfere?

Half of the chemical firms said their spending plans were held in check by the anticipation of shortages of key materials. The other 50 percent of the industry expected no prob-

lems on this score.

Officially, at least, there is a serious shortage of steel. Steelmen generally maintain otherwise, some saying they'll be looking for customers next year. Production has risen from less than 100 million ingot tons a year before Korea to 108 now. It will be at a 120 million ingot ton rate by 1954 if present government plans are carried through.

Contributing to the apparent shortage are inventory hoarding and padded orders. Also indicative—buyers are not jumping for gray market steel as might

be expected.

To support steel production at present capacity, 3 million tons of scrap a month are needed. This amount was not met in 1951, was

exceeded in 1950.

In order to spur flow of scrap, 1,200 scrap mobilization committees have been set up, and prices for scrap have been adjusted upwards. Chemical companies are starting to clean

out their boneyards.

Another cause for some alarm is the electrical power pinch—brought on largely by the steel shortage. The chemical industry figures to fare better than most, however. One reason is that many of the campanies generate a large share of their own requirements. Another is that the industry has taken steps to avoid a shortage by expanding its own facilities.

Industry Has Faith

Despite the tremendous burden of corporate taxes, it is not likely that the expansion program will be slowed down by any shortage of funds. Some industries are planning sharply reduced capital spending. But the financial position of the firms planning the most substantial outlays seems equal to the task.

During the past four years, capital investment in plants and facilities has increased fastest in the South and

West

This increase has been due to entirely new operations, rather than relocation of plants now in the East. The decentralization of industrial regions is taking place in spite of a lack of skilled and semi-skilled workers in the areas in which new plants are springing up most rapidly.

Petrochemicals are responsible for much of this—they now represent about 25 percent of all chemicals being made in this country and they may go to 50 percent by 1962.

If the defense program were to be sharply curtailed and a business let-down appeared imminent some firms would trim their expansion programs. But, at the moment, neither of these possibilities seems to be in the cards for 1952.

The McGraw-Hill survey shows clearly that expansion for defense will be theme for many industries this

year.

And it's important to realize that this peak program of capital expenditures represents industry's faith in the future soundness of the American economy.

CPI HIGHLIGHTS Chlorine Frees Caustic

Projected chlorine plant facilities are expected to bring output up to requirements by 1953. Rated capacity at beginning of 1951 was 2.1 million tons per year. A rate of 3.4 million tons is scheduled by the end of 1953. This is more chlorine than industry is expected to need, but allowance is being made in the event of a full-scale

With all this expansion in chlorine production, there will probably be plenty of caustic to spare. If more commercial projects like the proposed chlorine from hydrochloric acid plant of Hercules take hold, the situation will be improved. National Distillers' current expansion of sodium facilities is providing chlorine without caustic, as is Solvay's project for getting chlorine from nitrosyl chloride;

but the limit here is the market for byproduct sodium nitrate.

Mercury cells are gaining a stronger foothold. Projects under way involving them: Mathieson Alabama Chemical at McIntosh, Ala., Monsanto at Muscle Shoals, Ala., Pennsalt at Calvert City, Ky., and Solvay at Syracuse, N. Y.

Diamond at Painesville, Ohio, is dropping the lime-soda process in

favor of electrolytic.

AEC Keeps on Growing

Investment in plants and facilities for the atomic energy program is now at \$2.5 billion. Current expansion will jump this to \$5 billion. And another expansion of the order of \$6 billion is under consideration. This would make the AEC bigger than any other business organization in the U. S.

The Savannah river project now under way, for which \$1.25 billion will be spent according to the latest upward revision, is probably the greatest single construction project

ever attempted.

There is, nevertheless, a limit: supply of uranium. This situation has shown substantial improvement, how-

ever.

There have been new supplies discoveries in Canada, extension of discoveries in Colorado, improved and more economical methods for extracting uranium from lower-grade ores, and an agreement whereby U. S. and Great Britain have access to uranium ores which occur as a residue in the production of gold in the Union of South Africa.

Also contributing will be several new superphosphate plants designed to recover uranium as a byproduct from wet-process phosphoric acid production.

Petroleum Needs Reserve

With estimated capital expenditures last year of \$2.5-3 billion, the petroleum industry has spent around \$13 billion in the last six years on expansion.

Of this figure 55 percent went for crude oil and liquid hydrocarbons, 18 percent for refining, 14 percent for transportation, and 11 percent for

marketing.

Government planning calls for a reserve capacity in all divisions to meet an all-out emergency. Because of sharply increased consumption in the last two years, the reserve capacity its now far below the set level, particularly in refining and transportation.







New facilities for synthetic detergents, xylenes and cyanides are among the projects now under way to increase production.

New facilities coming in 1952 will have to meet an increased domestic demand for refined products and attempt to raise the reserve capacity. Goal is to up refining capacity from the present 7 to 8 million barrels per day by the end of 1953.

Shutdown of the Iranian refining facilities won't interfere seriously. Exports of refined products to the British jumped sharply during the last quarter of 1951 because of the shutdown. Despite this, above-ground stocks increased during 1951 by an average of 90,000 bbl. per day (30,000 crude, balance refined). If the British refinery in Iran should be re-opened, the export of refined products from this country probably would drop to a trickle.

Except for pipeline construction jobs where there was a shortage of steel products, the industry has not been handicapped materially by material shortages.

A record of more than 44,000 wells were drilled in 1951, compared with 43,000 in 1950. Wildeat operations were running 25 percent ahead of 1950.

Fertilizers Aimed High

A large expansion of our nitrogen plant facilities is under way to meet the demand for higher farm yields.

DPA has set a goal of 2.9 million tous of nitrogen for 1954-1955. This is 80 percent higher than the 1.6 million tons produced in the 1950-1951 biennium.

More will come from a number of reactivated World War II plants, and from private projects aided by tax amortization benefits,

While plants will make about 5 percent more nitrogen and potash next season, priority sulphur demands may cut superphosphate production by 10 percent. And the sulphur shortage is re-awakening interest in nitric acidulation of rock phosphate, al-

though no commercial-scale facilities for this have appeared as yet.

Several of the superphosphate plants now going up or planned will produce uranium as a byproduct from the wet-process phosphoric acid.

Most of the ammonia plants now under construction will get their hydrogen from natural gas, instead of from water gas. And at least one will use cell hydrogen.

At least two farmers' organizations (Consumers Cooperative Association and Mississippi Chemical Corp.) were involved in synthetic ammonia projects during 1951.

Rubber Is Adequate

Although the current rubber situation is good (enough natural and synthetic to meet all essential needs for a five-year all-out war, savs John L. Collyer, president of B. F. Goodrich), continued expansion is under way to meet bigger civilian and military requirements in 1952.

Current output of U. S. synthetic rubber plants is more than 930,000 long tons per year. The 1952 production of synthetic will top the previous peak reached during World War II, and will supply 65 percent of the total rubber demand.

This expansion will be marked by further conversion of general-purpose synthetic rubber (GR-S) plants to the so-called "cold" type. This type is being increased to 75 percent of the planned total GR-S output of 71,720 tons per month. Output of cold rubber accounted for only 50 percent of last fall's GR-S total of 53,770 tons per month.

Resins Add 10 Percent

This year's production of synthetic resins will be up approximately 10 percent to 2.6 billion pounds. This compares with an estimated 2.365 billion for 1951 and an actual 2.15 billion in

1950. New facilities for ethylene, benzene and phenol coming in during 1952 will provide a good measure of the raw materials for synthetic resins.

Vinyls, polyethylene and phenolics are headed for record outputs. Of these, only polyethylene will still be unable to flow fast enough. Polyvinyl acetate and butyral facilities will probable produce enough to lessen demand but not enough to meet it fully.

At least five expansion projects were under way in 1951 for each of the following: vinyls, polystyrene, phenolics and polyvinyl chloride.

In the field of fluororesins, Minnesota Mining & Manufacturing made news with its introduction of the electrochemical method of making them on a semi-commercial scale—eliminating elemental fluorine. Du Pont has expanded its output of Teflon and Carbide & Carbon has received a \$1.6 million certificate for fluoroethane resins.

Synthetic Fibers Surge

Plants for the newer synthetic fibers put out 180 million pounds last year, or 15 percent of the total synthetic output, the balance being rayons and cellulose acetate. The 1950 output of newer synthetics was 145 million pounds. Total synthetic production is now 20 percent of all textiles.

This year and next will see rayon capacity up 25 percent along with substantial increases in the newer synthetics. Estimate for 1960: 750 million pounds of the newer synthetics or 10 percent of all textile production.

More than \$139 million will go into synthetic fibers via certificates of necessity already granted (Chemstrand Corp. got \$88 million for nylon and \$25 million for Acrilan staple, Monsanto got \$25 million for acrylonitrile).

Du Pont has licensed its nylon patents to Chemstrand and is under







CPI leaders in the current expansion are aluminum, aromatics from catalytic reforming operations, and nitrogen fertilizers.

pressure from the government to set up more comers in the business. Meanwhile, Du Pont continues with its most recent nylon expansion projects at Seaford, Del., Martinsville, Va., and Chattanooga, Tenn., now largely completed. (Du Pont nylon production rose from 100 million pounds per year in 1950 to 170 now and will reach 190 during 1952.)

Carbide & Carbon threatens to join Du Pont in acrylic fiber production in South Carolina, with its newest dynel plant. Du Pont is producing continuous-filament Orlon there, and is building a plant for Orlon staple at the same location. By the end of 1953 total output of acrylic fibers is expected to reach 100 million pounds per year, 30 million of this to be dynel. Orlon is on the way towards 200 million pounds per year within a decade.

Sulphur's a Headache

Sulphur mining facilities going up at the huge new deposits discovered near New Orleans should yield 500.000 long tons per year by late 1953. There will be increased supplies also from petroleum refinery waste gas installations, natural gasoline plants, and smelting operations.

These planned facilities will add over 2 million long tons to the present 64 million long ton annual capacity by 1955. However, sulphur is due for a tighter pinch in 1952 before relief

Despite the current interest in developing non-Frasch sulphur sources, Frasch-minable deposits will supply at least half of the output expected by the end of 1954. Twenty or more of the non-Frasch projects under way during 1951 involved petroleum companies.

Continental Sulphur & Phosphate and Wyoming Gulf have been seriously considering the Chemico process for recovery from low-grade ores. So far the only commercial unit for this process is the plant now under construction in Colombia, South America.

Pulp & Paper Gains

If all the certificates of necessity already granted are acted upon, wood pulp capacity will be increased by 2.5 million tons per year; that's about 15 percent of the industry's present total capacity. Government controls on building construction may interfere, and producers are worried about getting enough sulphur, chlorine and alum.

Last year's expansions increased pulping capacity about 1.4 million tons and brought the present total capacity figure to 17.6 million tons per year.

Eleven of the expansion projects under way are for semi-chemical pulp, boosting output from 750,000 to 950,000 tons per year. Indicating a solid trend, this adds up to a four-fold increase over a five-year period. Reason: more economics through higher yields and utilization of hard-wood species.

Production of dissolving pulp is trending toward the long-neglected hardwoods. Buckeye Cellulose Co.'s plant in Florida will use a process that can make dissolving pulp from either hard or softwoods. The first major plant to use such a process, International Paper Co.'s Natchez, Miss., plant has been in operation since mid-1950; it turns out dissolving pulp from hardwoods at a rate of about 100,000 tons a year.

Antibiotics—Over Half

New plants being brought in for penicillin production by five major manufacturers are about to double last year's capacity, which in turn was triple that of 1948. This is just one of the highlights in the growth of the antibiotics industry, which started from nothing nine years ago to represent now over 50 percent of all ethical drug sales.

One dollar for every four spent for prescription drugs went for antibiotics in 1950, when 853,000 lb. of medicinal antibiotics were produced at a sales value that reached a total of \$214 million.

Last year Upjohn began production of a new antibiotic, neomycin. Parke, Davis is doubling its output of chloromycetin with the first completely synthetic plant for antibiotic production. Schenley got under way with a 30 percent expansion of its antibiotic facili-

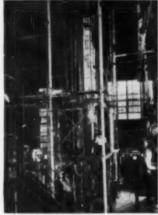
Pfizer will more than double its production in 1952 and terramycin will be the major share of this. American Cyanamid (Lederle) is tripling its capacity for aureomycin.

One of the major reasons for the continuing growth of antibiotic production is the newly-opened animal feed supplement market. Lederle estimates that as much aureomycin is going into feed as into medicinals. The big four in feed are aureomycin, terramycin, bacitracin and penicillin.

During the next few years, the industry will probably concentrate on expanding output of the presently-established antibiotics. rather than starting with new ones. Despite all the research in the last ten years, only six really effective, usable and commercial antibiotics have been found: penicillin, streptomycin, bacitracin, chloromycetin, aureomycin and terramycin. With the possible addition of neomycin and viomycin, it seems unlikely that this number will be increased in the near future.

It seems likely the industry will probably tend to concentrate on widening the market; selling abroad, where the demand is much greater and discase germs flourish more than at home; increasing production and uses for the present antibiotics.







LABORATORY, to pilot plant, to full scale production unit, is a flowsheet of process growth that spells continued improvement.

Technology Front Reports New Progress

Demands brought about by increase in normal business tempo, coupled with rearmament requirements, are being answered as the industry brings processes and technology to new heights.

Process industries made tremendous progress in processes and technology during the past two years. Although it's true that shortages and rearmament were effective spurs, many of the advances would have been made even without the emergency.

For the highlights of technologic advance, in little detail but in much greater number, turn to page 185 where some 190 developments of 1950-51 are tabulated.

The Atom Accelerates

Not all of AEC's technical interests, by any means, were absorbed by the search for new atomic weapons. A vast expansion is under way to double the present investment in nuclear facilities, progress is being made in the design of nuclear propulsion engines for airplanes and submarines, and work has been started on the plant to make raw material for the so-called hydrogen bomb.

On the Savannah River, Du Pont is putting up a huge \$1.25 billion installation in which—it is presumed—hydrogen-3 will be made. This isotope (tritium), it's believed, can be made by the nuclear bombardment of lithium-6 in plutonium reactors.

If it can be made to work, the H-bomb reaction will probably consist of the fusion of tritium with itself, or with deuterium, at the tremendous temperatures possible in the heart of a normal atom bomb explosion. Such a fusion should release tremendous energy. And more important, the energy release would not be limited by questions of critical size which originally circumscribed the conventional Abomb.

AEC is also interested in less spectacular ways to release energy. In this vein there were two significant developments. The first was AEC's appointment of four industry teams—Monsanto-Union Electric and Dow-Detroit Electric, and two other non-themical groups—to study the possibilities for industrial power from nuclear reactors. Their job is to spend a year trying to find out if it's feasible and economical to use power-producing reactors to make plutonium for the government, and byproduct power for industrial

V Just as 1951 was ending, AEC made what may prove to be one of its most important announcements: the new breeder reactor at Idaho Falls has produced electric power at the rate of 100 kw., using liquid metal to transfer a small amount of heat from the pile to a steam boiler. This provided steam to a conventional turbo generator.

The announcement described the operation of the experimental breeder as successful—leaving it to the reader to judge whether both the "breeding" and the incidental power generation

were successful, or only the latter. But now it's clear that—economics permitting—heat can be recovered at a high enough temperature for use in a heat engine. As the English have shown at Harwell, low temperature heat for building heating can also be recovered successfully.

Rock Will Give Uranium

The U.S. and her allies believe they control the bulk of the world's high-grade uranium resources. But these lie mainly outside our own borders.

AEC, taking no chances, has come up with a valuable supplementary uranium source in phosphate rock.
The uranium content of phosphate rock is low-only a few tenths of a pound per ton-but the consumption of rock is tremendous. About 75 percent of the 11.7 million tons of rock used in 1951-that from Florida and the West-contained uranium. AEC has developed a highly secret process to take out uranium from the wet process phosphoric acid used in making concentrated superphosphates. It is also understood to be working on methods of recovering the fissionable metal from single-strength and nitric acid supers; prospects here are more elusive.

Meanwhile, a boost is being given to the manufacture of wet process phosphoric acid and the stronger supers; several plants are going actively ahead. Blockson Chemical, International Minerals & Chemical, and Virginia-Carolina are building plants to recover uranium. Dow and Tennessee Corp. have operated pilot plants. General Chemical, Mathieson and Armour Fertilizer are in the research or pilot

plant stage.

Although AEC could run smack up against the sulphuric acid shortage in its prodding of wet process phosphoric acid, it's a safe guess that here is one spot where the 90 percent sulphur limitation will be relaxed!

Forward Ti, Zr, Hf

Electrolytic processes for making titanium seem to be much closer to realization than a year ago. Yet pressure of defense needs is forcing major expansions to stick to the now well-established magnesium reduction process. The logical integration of this process with electrolytic magnesium production became a fait accompliduring 1951, with the investment of \$14 million by Titanium Metals Corp. of America, at the site of the wartime Basic Magnesium installation at Henderson, Nev.

Horizons Titanium Corp. has re-

Horizons Titanium Corp. has recently been formed to exploit a process which is rumored to be electrolytic in nature. A Navy announcement optimistically predicts \$1 metal, but Horizons has yet to confirm this pre-

diction.

National Lead (part owner of Titanium Metals) has an electrolytic process in pilot plant at Sayreville, N. J. Du Pont, the other major producer in addition to Titanium Metals, hasn't disclosed the direction of its research efforts; it's a good bet that electrolytic production of the metal is on the program.

Latest news on this metal comes from Columbia University. There Arthur Kerbecek, a graduate student working under Dr. Colin Fink, noted electro-chemist, has succeeded in electrolyzing titanium tetrachloride. So far, Kerbecek hasn't reported any metal meeting commercial purity re-

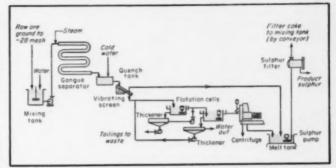
quirements.

Titanium technology has been extended to the limited production of zirconium and hafnium. Both of these, because of their nuclear properties, are of more current interest to AEC than

they are to industry.

Zirconium-like titanium-is made by magnesium reduction of the tetrachloride. To get the highest possible purity, essential for research purposes, zirconium sponge from the magnesium process is reacted with iodine to form the tetraiodide; this thermally decomposes on a hot filament to give a very pure crystalline bar.

Hafnium is made in about the same way. It is normally present as an impurity in zirconium compounds, and



CHEMICO's new sulphur process will make high-grade sulphur from low-grade ores.

the big problem is to separate it from the zirconium. Foote Mineral Co. distills a mixture of pure Zr Cl. with phosphorus oxychloride. The hafnium in the mixture, along with other lowboiling chlorides, concentrates in the distillate.

Cobalt and Lithium Gain

The sudden and rapid increase in lithium demand often means production at any cost, even where equipment or processes are known to be inefficient. Yet most concerns are expanding output and improving their facilities.

Lithium Corp. of America is putting up a large flotation unit at its spodumene mine. When the unit gets under way, probably during the first quarter of 1952, it will hike the country's output of lithium chemicals. The concentrate, a through-50-mesh product with a lithia content of about 5 percent, will boost the capacity of the company's St. Louis Park extraction facilities by about 50 percent.

Foote Mineral Co. also has a new process for lithium which will double its production in the primary refining stage. An expansion of over \$200,000 at its Exton, Pa.; plant was slated to be finished at the end of the year just

past.

Cobalt, also due for a sizable expansion for several defense-important reasons, has formerly been made by a single U.S. producer, Bethlehem Steel. Most of the metal has been imported

in the past.

Now, however, a new Chemical Construction Corp. refining process will be used by two producers to up the domestic supply by some 4.6 million lb. annually. A U.S. Bureau of Mines process will be used to up the cobalt content of cobaltite concentrates produced from an ore initially containing only 0.6 to 0.8 percent Co.

Sulphur Search Is on

Many a U.S. chemical producer woke up to the sulphur shortage last year. And unless something happens to throttle the expanding demand, the shortage cannot be entirely overcome for a number of years, despite strenuous efforts to bring in new native sulphur and alternate sulphur sources.

The problem is not one of adequate sulphur in all its available compounds. It is a question of time—and of eco-

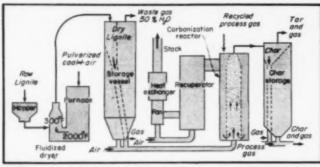
nomics

With native Frasch-process sulphur at \$21-22 per long ton, it's tough for the metallic sulphides, sour gases, gypsum and sulphur in coal to compete. A pyrites acid plant, for example, costs twice as much, and a gypsum acid plant, three times as much as a brimstone plant. At the same time, relative acid costs are in the order of 1.0 for brimstone, 1.25 for pyrites, and 1.7 for gypsum. Smelter acid could compete readily but much of the smelter capacity is too far from acid markets to justify much more recovery.

Most of the emphasis on sulphur expansion, therefore, is on bringing in new Frasch-process mines and on recovering elemental sulphur from sour refinery and natural gases. By the end of 1953 there will be about four times as much new Frasch sulphur as new H_sS sulphur, although the latter may then come to 8-10 percent of our brim-

stone supply.

The process for reducing H_sS to elemental sulphur is an old one which has been modernized since the first U.S. plant was built in 1944. Four or five variations of the process are currently being installed; they differ only in detail. In general, they burn to SO_k one-third of the H_sS concentrate from an absorption plant, react the gas mixture to sulphur and water over a bauxite catalyst, then condense the sulphur either by a sulphur spray or surface condenser.



LIGNITE char via fluidized low-temperature carbonization will power aluminum.

If low-grade sulphur ores prove to be sufficiently plentiful, then one hope for the future may be Chemico's concentrating process. One unit is now being installed in Colombia. The ore is ground, heated in water suspension above the sulphur melting point, screened, and the minus 20-mesh particles subjected to froth flotation. The product is finally melted and filtered to 99.5 percent brimstone, Predicted cost is about \$15 per long ton.

Another sulphur-producing method

Another sulphur-producing method that's being considered in Canada is the release of half the sulphur content of pyrites in elemental form by distillation. The remaining sulphur in the sulphide can be recovered only as SO₂ or as sulphuric acid, unless some method for reducing SO₂ is adopted.

Consolidated Mining in Canada, and others in Europe, used a coke reduction process for converting waste SO₂ to sulphur for a number of years; American Smelting & Refining, at Garfield, has used natural gas successfully as the reducing agent on a 5-ton pilot plant scale. Neither process is now in use in North America. But the time may be approaching when ways to get brimstone from SO₂ will become attractive.

Still another Canadian development may point the way to more recovery of smelter gas, despite the problem of distance from market. International Nickel is about to introduce an oxygen flash-smelting process which yields a 70 precent SO₂ gas. Such a gas can be liquefied by compression without further concentration, although there is an off-gas which requires an acid plant for recovery. Canadian Industries, Ltd., is building a plant at Copper Cliff to use this SO₆, which it will ship in liquid form to Canadian paper mills.

Although sulphuric acid economy cannot be the deciding factor in reaching a supply-demand balance for sulphur, it may be able to play a considerable part—especially in the fertilizer industry, by all odds the top end-user of sulphur. TVA's current interest in non-sulphuric methods for acidulating phosphate rock could save a lot of acid if taken up seriously by any considerable part of the fertilizer industry.

Chlorine Steps Out

Chlorine continues its spectacular surge. New plants going up or projected should jack up capacity by at least 1.1 million tons per year.

A significant aspect of the increase is the strong trend toward the mercury cell which can make rayon-grade caustic without purification and can usually deliver its caustic in strengths up to 73 percent without supplementary concentration. Solvay is putting in two big installations, at Syracuse and at Moundsville, Va. Mathieson is equipping a new plant at McIntosh, Ala., with its own mercury cell design. Penn Salt, at Calvert City, Ky., is to have the first sizable U.S. installation of the Italian De Nora cell. Previously the only plant scale De Nora installation on this continent was the one at Marathon, Ont.

From a technical standpoint the most interesting chlorine trend today is the one toward chlorine without caustic. Mainly, people are looking toward the chlorine possibilities of the 400,000 or so tons of byproduct HCl produced each year in organic chlorinations.

Several methods have been explored for the recovery of chlorine from HCl. For example, Westvaco has developed a cell and designed a plant which is said to make chlorine efficiently without the inherent disadvantages of either direct electrolysis or the old Deacon process. The trick is to oxidize cuprous chloride with air in the presence of HCl, forming cupric choride which goes to the cell. Electrolysis or the cell.

sis of the cupric chloride gives chlorine and regenerates cuprous chloride at the cathode. This solution then returns to the gas contacting vessel for reconversion to the cupric form.

Another method—the Grosenor-Miller, calls for initial absorption of the HCl by fertic oxide containing potassium chloride. Chlorine is regenerated from the ferric chloride by contact with air, while the ferric oxide recirculates.

Dow pilot-planted a somewhat similar process in which the oxide travelled downward through a vertical shaft, contacting HCl in the upper part, and air in the lower part. Chlorine comes off at a choke-point half way up. The oxide leaving the bottom of the shaft is elevated and recirculates. Now Hercules Powder Co. has been licensed by Dow to use the process in a 35-ton per day plant at Brunswick, Ga.; byproduct HCl from toxaphene manufacture will be the raw material.

Another new chlorine wrinkle is being considered by Solvay at its Hopewell, Va., nitric acid-salt chlorine plant. In this process nitrosyl chloride, NOCl, is a byproduct. The scheme is to react the NOCl with oxygen, recovering another atom of Cl, and regenerating nitric oxide which makes additional nitric acid for return to the process.

Lignite Gets a Break

Exhaustion of cheap fuel resources is not an immediate problem, but certain developments are already looking toward the use of marginal fuels.

Commercial use of lignite has long been a challenge. Now, 1952 will see something concrete being done about it. Power for a new Aluminum Co. of America plant in Texas will be generated by boilers fired with lignite char. The char will come from a new low-temperature carbonization plant that'll make 3,200 tons per day of char and 2,300 tons per day of tar from a feed of 7,000 tons of lignite.

The process hinges on the carbonization of minus 4-in. particles of lignite in a boiling bed at a temperature of 900 deg. F. It was developed by the Bureau of Mines at its Denver laboratories. Bureau personnel claim that this process will produce char that can compete economically with natural gas as a fuel. The claim seems to be borne out by the fact that one plant is already going up—and in the gasabundant southwest.

Another marginal fuel—thin coal seams which cannot be recovered economically by mining—is still being looked at by the Bureau of Mines. During the year the Bureau reported further progress on underground coal gasification. Its first experiment, conducted in cooperation with Alabama Power Co. at Gorgas, Ala., in 1947 was inconclusive. The second test, recently reported, indicated commercial possibilities and produced a gas which was initially as high as 300 Btu., but which held at 120 Btu. for a fourmonths period.

Now a new technique, developed at Hume, Mo., by Sinclair Coal Co. and Missouri School of Mines, is to be tried out at Gorgas. Instead of drilling a tunnel through the seam between the blow holes, an effort will be made to start a channel by means of an electric current. Confirmation of the Sinclair experiment would offer a more economical method of starting up an underground gasification operation.

Cracking, Reforming Advance

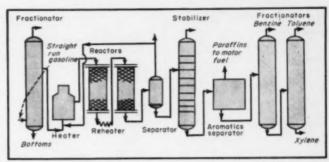
Further development of catalytic cracking processes continues apace. One effect has been to demand vastly greater tonnages of catalysts from the chemical industry. The industry is answering this challenge by putting up new catalyst plants and expanding its old ones. The big demand is for microspheroidal catalysts for fluid cracking, first produced by Cyanamid in 1946.

Developments in fluid cracking include the UOP process and Kellogg's Orthoflow process; both involve the combination of the reactor and regenerator in a single tower.

Houdriflow offers an improvement over the TCC moving bed process by providing a flue gas lift—instead of bucket elevators—for transporting the catalyst. Socony-Vacuum has countcred with the Airlift-TCC, including a package design for small capacities.

Although it was developed primarily to upgrade the octane rating of natural and straight-run gasolines, catalytic reforming promises soon to become the answer to the chemical industry's rising needs for benzene and toluene. Several new processes all operate continuously and differ chiefly in their type of catalyst and the method of handling it.

UOP's Platforming was the first new post-war catalytic reforming process in commercial production. It uses a fixed bed platinum-containing catalyst that doesn't have to be regenerated. A different catalyst, likewise containing platinum, is used in Atlantic Refining Co.'s new process. Houdry has recently come out with still an-



UOP's Platforming process is now adapted to catalytic reforming for aromatics.

other fixed-bed method-Houdriforming-that uses what's claimed to be a highly selective special catalyst.

Two other new processes use cheap catalysts which are continuously withdrawn for regeneration. Socony-Vacuum calls its process Thermofor catalytic reforming, implying that it's similar to the Thermofor catalytic cracking process. The TCR process uses a low-cost chromia-alumina catalyst in bead form. Fluid hydroforming, developed by Standard Oil Development, Standard Oil of Indiana, and M. W. Kellogg, makes use of a fluidized catalyst bed.

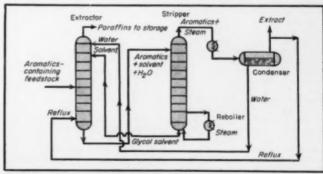
The type of reformed product whether high-octane gasoline or a stream high in recoverable aromatics depends largely on the type of feed stock. To produce aromatics, the feed will contain a maximum of C_a naphthenes.

Reforming is also becoming important in the natural gas industry, both in cutting the Btu. to about 300 for city gas production, and in making synthesis gas. Gas Machinery Corp. has developed a high-temperature long-tube reformer; Koppers has a regenerative reforming furnace of the checkerbrick type.

Arosorb Aids Aromatics

Production of aromatics from petroleum fractions by catalytic reforming requires that the aromatics be separated from the other hydrocarbons in the reformer product. Sun Oil Co. is building a unit at Marcus Hook which will do this by selective adsorption, producing 13 million gal. of benzene and 30 million gal. of toluene per year. This is a radical departure from the conventional processes that use solvent extraction or extractive distillation. This process is called "Arosorb."

The adsorbent is a fixed bed of silica It selectively adsorbs benzene and toluene, allows paraffins, naphthenes and other non-aromatic hydrocarbons to pass through. When the bed is saturated, it is washed with butane, then desorbed with mixed xylenes which displace benzene and toluene from the silica gel. A train of fractionators recovers butane and xylenes for recycle, and discharges from the process separate streams of benzene, toluene and saturated hydrocarbons. Davison Chemical Corp. gets an assist for the development of the special adsorbent.



DOW, UOP jointly developed Udex diethylene glycol extraction for gromatics.

Acetylene Aims High

Acetylene from natural gas will soon be a large-scale commercial reality in this country—assuming that Monsanto and Carbide & Carbon carry through their plans for Sachse process units. Both units will be at Texas City. Carbide's entry into this field is highly significant: remember that Union Carbide is a major producer of calcium carbide, traditional source of commercial acetylene.

The fact that these two companies picked the Sachse process (partial oxidation) rather than the Wulff process (regenerative thermal pyrolysis) or the Schoch process (electric arc), may mean that oxidation has an inherent

economic edge.

On the other hand, Wulff Process Co. said early last year that it was ready to go into production with a small partial pyrolysis plant located in Los Angeles, designed to produce I million cu. ft. of acetylene per month. And the arc process, theoretically requiring only 1.8 kwh. per pound of acetylene, has been offered for license.

No matter which process is used, getting pure acetylene from the process effluent is a tough job. Monsanto will probably bank on water scrubbing, based on German practice, although Carbide will use an undis-

closed solvent.

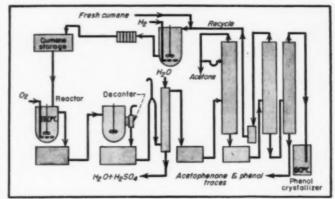
Chemical Construction Corp. tossed its hat into this particular ring by announcing that it is ready to design and build acetylene plants using partial oxidation. Chemico claims to have a superior selective solvent, especially developed for this purification.

Forward Fluorochemicals

Electrochemical fluorination, based on the cell developed by J. H. Simons at the University of Florida, and commercialized by the Minnesota Mining & Manufacturing Co. at its plant in Hastings, Minn., seems to be widening the industrial-economic spectrum of fluorine.

This process involves the passing of a current through a mixture of the organic starting material and liquid anhydrous hydrogen fluoride in an electrolytic cell. Hydrogen comes off at the cathode and the fluorochemical, as 2 gas or liquid, at the anode. The product is then purified by distillation.

The new process seems to have several important advantages. It uses, for example, non-corrosive anhydrous HF rather than elemental fluorine. The cell is compact, does not need a diaphragm, and is extremely flexible in its ability to produce brand new fluorine-containing compounds.



FOUR new plants will make phenol from cumene, avoiding need for chlorine, sulphur.

Cumene Gives Phenol

Now that sulphur and chlorine are both tight, the chemical industry is welcoming a new method of hooking substituents on to an aromatic ring without chlorination or sulphonation.

The new process in question makes phenol from cumene. Barrett plans to build a plant for this purpose in Philadelphia, and British-American Shawinigan plans a somewhat similar one in Montreal East. A little later, Standard Oil of California and then Hercules Powder Co. reported their intention of building still other plants to use

the cumene process.

Cumene is oxidized to the hydroperoxide in an inert solvent such as xylene or toluene, or in an oil-in-water emulsion at elevated temperature. Then the hydroperoxide is decomposed by boiling under pressure in the presence of an acid-sulphuric, phosphoric, acetic, or p-toluene sulphonic. Distillation separates the oily part of the reaction product into its components. Acetone goes overhead, cumene is recycled, and the product phenol cooled and crystallized. Since there is considerable acetone byproduct the in-

Fibers Get Sheep's Goat

dustry is wondering what its effect on the acetone market will be.

One of the most significant aspects of new developments in the field of synthetic fibers is the fact that the newcomers are mostly competitors of wool.

Wool is high and extremely unstable in price. But even in pilot plant production, the newer synthetics have been held to a maximum of \$1.85 per lb.; prices can certainly be lowered when output goes up.

Among these newer fibers are the

polyacrylics (Orlon), the acrylic copolymers (Vinyon, dynel, and Acrilan) and the polyester type (Dacron). It is significant that acrylonitrile is the base of all these fibers, except the last. And this explains part of the new-found interest in acetylene; most of the new acrylonitrile will be made from acetylene and hydrogen cyanide.

Du Pont's newest fiber, Dacron, is a condensation product of dimethyl terephthalate and ethylene glycol. Similar to the British Terylene, it will be turned out at a rate of about 35 million lb. per vear at Kinston, N. C. The Seaford, Del., plant is now making limited quantities and is expanding its capacity for dimethyl terephthalate, produced by oxidizing paraxylene directly to the ester in the presence of nitric acid and methanol. At Kinston, the ester will be reacted with ethylene glycol to make the Dacron fiber.

Enter Hardwood Pulp

Most significant development in many years in pulp and paper technology is the successful advent of the cheaper, more plentiful hardwoods as a substitute for soft woods.

First mill to make dissolving pulp from hardwoods went into commercial operation a year ago at Natchez, Miss, It is the first to use the kraft (sulphate) process successfully on hardwoods such as gums, bay and poplar.

The modified sulphate process used at Natchez is a pre-hydrolysis for effective removal of the pentosans and polyoses, followed by normal sulphate treatment and multistage bleaching. Rated originally at 100,000 tons per year, the company later said it planned to double its capacity.

This trend toward the use of hardwoods for pulp appears to be worldwide. Rayon dissolving pulp is to be made both in Spain and in Australia from the plentiful eucalyptus wood.

Piped Chemicals Fan Out

Although the idea is not new by any means, there's a definite trend toward using pipelines for handling chemicals over considerable distances. This is especially evident along the Gulf Coast.

About 200 mi. of chemical pipelines are planned or being laid in the Houston-Port Arthur area alone. These lines carry everything from acetone to styrene, from brine to refinery gases, from caustic to oxygen. They vary from 3 in. in diameter to 16 in. In length they run from 4 to 85 mi.

In another switch on the pipeline idea, natural gas transmission lines are being used to enable gas processing to take place far from the point of gas production. The lines carry wet gas containing light and heavier hydrocarbons. A petrochemical plant located along the right-of-way can siphon off substantially all the hydrocarbons except methane and part of the ethane.

One such recovery plant at Gabe, Ky., pipes liquid hydrocarbons 58 mi. to the new \$17 million plant of Mathieson Hydrocarbon Co. at Brandenburg, Ky. Here Mathieson fractionates the mixture, sells LP-G and cracks ethane to ethylene for producing ethylene oxide, ethylene glycol, and other petrochemicals. Much more recently, it has been announced that National Petro-Chemical Corp. will try out something similar in a \$32 million plant at Tuscola, Ill.

Still another scheme is the \$6 million underground pipeline which Hanna Coal Co. will lay from Cleveland roughly 100 mi. to Cadiz, Ohio, for transporting coal slurries. The company estimates that a coal-water slurry can be piped for a saving of \$1 per ton over rail charges when the distance is over 100 miles. The proposed line will move over 7,000 tons of coal a day. It has been granted public utility status by the state.

Piping Takes to Plastics

Although the chemical industry has long been a user of organic polymers as materials of construction, it's only recently that this trend, by way of plastic pipe, has assumed significance.

At present, three types of polymers are vying for honors—polyvinyl chloride, polyethylene, and reinforced polyesters. Right now, plasticized PVC seems to be in the foreground. Its rigidity makes it suitable for piping runs without continuous support.

A major drawback of rigid plastic pipe is its lack of toughness or impact strength. Uscolite, a recent development of U. S. Rubber Co., is said to possess high impact strength without sacrifice of rigidity. It is a blend of butadiene-styrene plastic with butadiene-acrylonitrile rubber.

Another plastic piping material introduced to the chemical industry during 1951 is Tenite II, a cellulose acetate-butyrate. It can be made in any degree of transparency, from clear to opaque.

Polyethylene, in spite of its lower rigidity, is finding its place in processing equipment because of its superior chemical resistance and light weight. Production of such items as valves in sizes up to 2 in., as recently announced by American Agile Corp., will enhance polyethylene's standing.

Glass fiber-reinforced polyesters combine good chemical and mechanical properties. They are well suited for small tanks, hoods, and large ducts, but are not widely accepted in the form of process piping. A major disadvantage is that threading must be done with carbide tools; a new catalytic cementing procedure may be the answer to this.

Wastes Make Haste

Pressure by public authorities for improvement in waste disposal has not lessened appreciably, despite the demands of rearmament. As a consequence, many important advances have been made.

One of the most vigorous attackers of the waste problem is the paper industry, with definite progress to report in several directions. Four Wisconsin sulphite mills are adopting the Conkey flat-plate (Rosenblad) evaporator for concentrating waste sulphite liquor to the point where it can be burned.

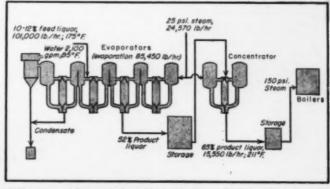
This is something that couldn't be done before because ordinary types of evaporator foul too much.

Another approach is the ammoniapulping sulphite process which has been used experimentally for a year at the Lebanon, Ore., mill of Crown Zellerbach. The waste liquor, which can be evaporated and burned as in the sulphate process, need no longer be dumped. The process reduces sulphur consumption materially, increases pulp yield and more than offsets the added ammonia cost factor.

The paper industry plays a part in two other waste disposal developments. One is a new method of stabilizing soil through the use of waste sulphite liquor mixed with a dichromate; this technique was worked out at Cornell for the Army.

The Gibbs unit, an agglomeration device for light suspended solids or immiscible liquids, has been used to recover fibers from white water, as well as on oils in waste water and similar applications. Tiny air bubbles dispersed mechanically in the treated liquor do the job of buoying and consolidating the suspended particles.

Another class of waste treating operation that has developed recently is catalytic combustion for odorous organic vapors. The Ruff process uses low temperature combustion of dilute gaseous wastes by means of a solid catalyst. Du Pont has recently disclosed a process - now in operation at Belle, W. Va., - that uses a copper chromite catalyst for destroying dilute organic vapors in water vapor. The process has been used on a mixture of formaldehyde, methanol and formic acid, and on a mixture of ethylene glycol derivatives. Although this method has been applied only in oxidizing vapor phase mixtures, it's likely that further work will adapt it to liquid phase wastes as well.



ONE route to sulphite waste disposal by burning is use of self-descaling evaporator.



BRASS CONFERS: DPA Administrator Fleischmann heeds Monsanto's Curtis and Cyanamid's Klipstein.

Washington Pushes Chemical Build-Up

Seasoned chemical executives convince mobilizers of industry's key role. Expansion goals for critical chemicals are lifted, and planners grapple with steel and sulphur shortages.

The chemical industry, with able spokesmen in Washington, has been getting fair treatment from NPA, DPA, OPS and other agencies. Not that there isn't disagreement about specific shortages.

NPA is decontrol bound in chemicals. Just recently it has taken allocation controls off plastic nylon and methyl chloride. Its policy is to decontrol chemicals as fast as expanded production makes that possible. "There is definitely no intention nor desire to keep items in classifications in which they do not belong," one Chemical Division official declares.

The NPA and DPA certificate of amortization program in chemicals is moving along on schedule. During January the DPA released new figures on goals for chemical capacity by January 1955. These will permit granting of more certificates. Some of the earlier certificate programs are well on the way to completion—benzene, for example.

Structural steel will continue short, probably until the last quarter of 1952. Chemical industry fared a little better in the first quarter 1952 allocations than in the preceding quarter. But there's no guarantee that

this will continue. NPA and DPA officials predict an extremely tight metal situation during the second and third quarters of 1952.

Steel for piping and tanks is short, and fabricators have shop capacity open as a result. But Washington officials stress that no chemical plant has been shut down because it couldn't get equipment.

On the OPS front, the Capehart amendment is expected to be of some benefit to those who can justify price increases. OPS has set up and staffed its Chemical and Rubber Division, and has held a number of meetings with representatives of the chemical industry.

Probably the greatest good done for the chemical industry in Washington has been the acceptance of the industry by more and more officials as a major segment of the U. S. economy.

Francis J. Curtis, vice president of Monsanto and former assistant NPA administrator in charge of the Chemical, Rubber and Forest Products Bureau, calls it "prestige." By this he means that government officials now realize at last that the chemical industry is not just "bottles, beakers and complex formulas." The shortage

of sulphur, particularly, helped to establish the fact that chemicals are important in every industry.

CHEMICAL PLANNERS

Kudos for Work Well Done

Top achievements of NPA's Chemical Division during 1951 were: (1) development of the organization; (2) fixing of the rotation policy for personnel from industry to provide a reserve of experts for any emergency; and (3) launching of expansion programs for various segments of the chemical industry.

The division functions as part of the Chemical, Rubber and Forest Products Bureau, headed by Assistant NPA Administrator Kenneth H. Klipstein. He took over last November when Francis J. Curtis of Monsanto left after putting in his "six months plus." Previously, Klipstein had succeeded Joseph Bates as director of the Chemical Division.

Present director of the Chemical Division is Osgood V. Tracy, on leave from his job as general manager of Esso's chemical products department. Tracy brings more than 20 years of experience in petrochemicals to his current task.

Five of the Chemical Division's seven branches deal with specific chemical products. The five: inor-

ganic and agricultural chemicals; coaltar products; protective coatings; drugs, solvents and detergents; plastics. The other two operating branches are service branches, one for chemical industry facilities, the other for program and requirements. In addition, the division has four staff groups for administration, issuance of orders and regulations, liaison with DPA's Requirements Committee, and dealings with industry advisory committees.

This channeling of advice to NPA through industry advisory committees is one of the smoothest working operations in NPA. It's directed by G. Lyle Belsley, assistant NPA administrator for industry advisory committees.

tees.

Belsley reports little difficulty in recruiting able men from the chemical industry for the advisory committees. In the chemical field alone, NPA has 41 industry committees with 469 members. There's one over-all chemical industry advisory committee; the others deal specifically with one or two major chemicals and are made up of producers of these chemicals. These chemical industry committees have held 60 regular meetings and several special ones to help NPA with chemical problems. Committee members are all key executives from the industry, and their knowledge and judgment contribute to the success of NPA's decisions and operations.

NPA's Chemical Division wasn't set up over night. When started early in 1951 it was short of personnel, had no definite organization, no policies or procedures. The growing pains continued until Tom Nichols, president of Mathieson Chemical and deputy NPA administrator, reorganized the NPA bureau set-up and established the six-month service idea. The expansion programs were begun at the

same time.

Under Kenneth Klipstein, the Chemical Division has been reshuffled so that its branch organization parallels that of the bureau set-up.

The division has issued the minimum of orders necessary to channel scarce chemicals into defense uses. It has acted on certificates of necessity, and powwowed scores of times with industry advisory committees.

Major problem faced by the NPA's Chemical Division in recent months has been the expediting of construction programs for chemicals despite the impact of basic expansions in steel and aluminum. This is still the current problem and it appears that it will be the 1952 problem unless there's an outbreak of greater military activity.

PROSPECTS

Toughest Phase Ahead

Output of chemicals for defense is mounting. Often, however, it's at the expense of civilian uses. But as the expansion program is pushed through, the ability to meet defense and civilian needs will, of course, im-

nrove

NPA considers the supply of sulphur the most serious shortage problem. Production of sulphur is a Defense Minerals Administration problem, with distribution by NPA. All of the expanded facilities, chemical and otherwise, cannot operate with the present sulphur supply. Other materials, other processes will have to be used, NPA officials state.

Expansions under way will limit the duration of shortages. Some of the earlier programs, such as benzene, are showing results. Supply is almost in balance with demand.

NPA Chemical Division officials warn that the country faces the most difficult part of the mobilization program. Increasing military requirements will be deeply felt during the next six months to a year. There will be greater pressure on many chemicals and perhaps tighter controls for a time

But these officials are hopeful that from that point on supplies of basic chemicals will gradually increase, notwithstanding continuing production on a rising scale for defense. They believe that after adjustments to coordinate military and civilian requirements the chemical industry will emerge stronger and better equipped to meet demands for its products.

CONTROLS

Tight Despite Policy

NPA's policy is to decontrol chemicals now under allocation, inventory or other controls as soon as there's enough of each chemical to go around without anyone being denied what he needs. This is not mere talk, because controls on a number of chemicals have already been relaxed to a point where they are controls in name only.

Only seven of the 10 scheduled items on the M-45 chemical allocations order are still allocated: naphthenic acid, polytetrafluoroethylene, polyethylene, resorcinol, sebacic acid, methylene chloride and Thiokol. Sulphuric acid, nylon plastic and methyl chloride have been taken off allocation control.

In January NPA took all controls off bismuth (covered by order M-48) except a mild inventory control and the requirement that use and inventory be reported monthly.

Many chemicals, however, are still covered by M-32, which applies to producers and distributors and imposes DO limitations. It permits rejection of rated orders if received less than the prescribed number of days before the first of the month in which shipment is requested.

The M-31 order on chlorine is also still in force. It applies to producers and distributors, and covers rated orders and orders for chlorine essential

to public health.

Deliveries of cadmium are controlled by M-19, which also lists purposes for which cadmium can be used and imposes inventory controls.

Under M-66, graphite and carbon electrodes can be delivered only by

allocation from NPA.

Sale or delivery of steel shipping containers is restricted by M-75, which limits uses of such containers. Cans are controlled by M-25, and packaging closures by M-26, which restricts use of closures made of tin plate and aluminum and limits use of aluminum foil.

Aluminum for destructive use is restricted by M-84 and held to the minimum amount and lowest grade necessary for the particular use.

necessary for the particular use.

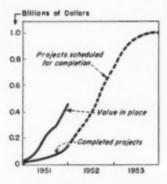
The rubber order, M-2, puts overall limits on consumption of new rubber (including both natural and synthetic, but excluding natural rubber latex). It prohibits private importing of natural rubber; provides for allocation of government-produced synthetic rubber, and for distribution of natural rubber. It calls for maintaining production of camelback retreading material and other more essential rubber products and for directing production of rubber into standard lines.

Under M-72, inventories of chemical wood pulp intended for the market are limited and consumption is held to 95 percent of 1950 use. The order provides a 3 percent production reserve of chemical wood pulp manufactured by integrated mills, and of captive chemical wood pulp.

The all-important sulphur order, M-69, has now been amended to limit use to 90 percent of 1950 consumption. Shipments by suppliers are prohibited except with NPA authoriza-

tion.

Closely related is order M-95 on sulphuric acid. It requires each producer to offer for sale each month a percentage of his scheduled monthly production equal to the percentage he sold in 1950. No supplier may deliver more than 20 tons of 100 percent sulphuric acid unless the purchaser furnishes a statement of his proposed use. Sulphuric is still covered by the inventory restrictions of NPA regulation No. 1. Originally, sulphuric acid came under schedule No. 3 of the M-45 chemical order, but that schedule was revoked on Jan. 1, 1952, when the new M-94 order was issued.



EXPANSION BOX SCORE Tax Writeoffs Pave Way

At year's end, the mobilizers of the Defense Production Administration came up with their first report on progress of the fast amortization program for expanding chemical facilities. What it showed was this:

Out of about \$1 billion for chemical expansion, projects actually completed by the end of 1951 amounted to less than \$150 million.

But the value of construction and equipment put in place by the end of the year came to about \$450 million. By September 30 of this year about \$600 million worth of the new facilities will be ready for production—and about \$900 million worth will be completed by the end of the first quarter of 1953.

In a companion report on certificates of necessity issued through November 30, the mobilizers revealed that "at least a 10 percent cut" is being made in the percentage of the cost of facilities that can be granted a fast tax writeoff. As of October 19, the average tax amortization allowed on total proposed investments was 65.4 percent. The percentage allowed on cases processed from October 19 through November 30, however, was only 47 percent.

As always, there are exceptions to the ruling—but the general impact is clear. Firstcomers got the best break on amortization. Now that industrial expansion goals are becoming more definite, there's less need for the mobilization officials to give tax benefits.

Some segments of the chemical industry were ahead, others behind the average for the whole expansion program. Of the \$10 billion total reported on, 46 percent was expected to be in place on December 31. In the chemical field, though, the value in place varied from 19 percent of the \$123.5 million of synthetic fiber facilities planned, to 60 percent in place of the \$182 million of capacity for industrial organic chemicals.

This is the year when most of the expansion of plant will be completed. But there's still a good bit of new capacity that won't come into production until the end of 1953. The mobilizers admit that even these targets will be hard to hit. As DPA points out, "Since this chemical expansion program has not received full allotments of materials, the task of meeting this schedule becomes more difficult."

Adding to the difficulty is the determination of the mobilizers that capacity goals for certain chemicals must be raised. It remains to be seen whether the decision to spread out the build-up of U. S. armed strength will make it easier or more difficult to bring plant expansion along at a faster rate. For the other side of this situation is the fact that the big military spending won't begin tapering off in 1953, but continue into 1954.

PRODUCTION TARGETS Greater Output Wanted

The Defense Production Administration is shooting for higher production goals in a number of chemicals. Targets have already been set for phenol (p. 169), nitrogen (p. 172) and phthalic anhydride.

Phenol capacity is to reach 623 million pounds by the beginning of 1955, up 280 million pounds over capacity in January 1951. Currently phenol is short, and U. S. output is being distributed by industry under an informal allocation system. Deficit in production will still be about 20 million pounds during 1953, DPA believes. Last year one new installation was put into operation, and from 60 to 80 million pounds of new capacity is expected to start this year.

During the year just past, nine applications for tax amortization were received covering projects that would increase phenol capacity by 277 million pounds a year. So far, five certificates have been issued covering about

162 million pounds a year. The remaining four will probably be issued

A nitrogen goal by 1955 of 2,930,000 short tons was set by DPA in January. This is an expansion of 1,390,000 tons over capacity of the industry in 1950, and raises the sights by 500,000 tons over what is already under construction now. Of the capacity needed in 1955, 2,430,000 tons is already built or authorized. U. S. production at the beginning of 1950, before Korea and the arms build-up, was 1,540,000 tons annually. About 160,000 tons annually will come from the Morgantown, W. Va., ordnance plant scheduled to get into operation in March.

DPA doesn't think that capacity is being over-expanded. Officials point to World War II experience when fixed nitrogen capacity was expanded from 625,000 tons to 1,550,000 tons and use was found for it after the war. Fears of a postwar surplus did not materialize. Trend of use in industry and agriculture, besides the present military demand, makes expansion necessary. DPA says.

Phthalic anhydride production goal has been set at an annual capacity of 367,700,000 lb. by the beginning of 1955. This is an increase of 140,000,000 lb. over capacity on Jan. 1, 1951. There's not enough capacity now, and DPA has 13 applications for certificates of necessity involving proposed phthalic production of 208,000,000 lb. a year.

One plant receiving a certificate for rapid amortization is already producting. DPA says the chief problem in realizing production from the expansions will be the timing of the supply of raw materials, naphthalene or orthoxylene. It looks as though enough raw materials will be available.

The new goals for these and other chemicals will permit DPA to issue more certificates of necessity for reduced amortization.

STEEL FAMINE It Holds Up Expansion

How much steel the chemical industry will get for plant expansion during the second and third quarters of 1952 is hard to tell. The industry had an idea that it would get its share right after the higher-priority machine tool, steel and aluminum industries got theirs. But now the military are warning DPA that they'll be taking a bigger bite of steel. And atomic energy expansion will require more.

Chemical firms with projects under way and getting their steel on a hand-

to-mouth basis from quarter to quarter can take some comfort in NPA's intention to allot whenever possible on a project basis rather than on a

quarterly one.

Steel for a project would be allotted in advance for coming quarters, but deliveries could still be made only in the quarter for which the steel was allotted. However, this system, while preserving NPA's control, would at least give a firm some idea of how much steel it could expect as it goes on completing its structures.

There's one rift in the cloudy steel outlook for chemical industry. In mid-January DPA revised its priority system for granting certificates of necessity, adding for the first time 21 chemicals. Also, DPA is raising new goals for chemicals, requiring new plants. And since experts in DPA and NPA want to correlate granting of certificates with availability of construction materials, they presumably will see that the steel will be made available when they grant the certificates.

SCARCE METALS Stymie Equipment Makers

Anything made of steel, copper or aluminum will feel the pinch of the continuing shortage. The shortage will last longest in copper-some government officials predict five years.

Copper production is being subsidized by the government through purchase contracts with mining firms. The government pays over-the-ceiling prices for copper produced from high

cost deposits.

Aluminum production has now reached an annual rate of 860,000 tons, compared to the 735,000-ton rate of June 1950. By 1954, expansion will result in production at over twice the annual rate of mid-1950, and 12 times the rate of 1939.

Steel industry is now producing at the rate of 108 million tons, compared to a rate of less than 100 million tons at the time of Korea. Added capacity now under construction will lift production to a sustained level of 120 million tons by 1954.

All these expansions will mean more metal for defense and defense-supporting uses. There doesn't seem to be any problem of working this metal into equipment. In fact, some facilities for working iron and steel into process equipment for the chemical and other industries is idle now because the iron and steel have been diverted to more pressing needs.

The heavy metal tanks industry advisory committee has protested to

NPA that its first-quarter allotments of controlled materials are highly inadequate

This industry produces pressure vessels and tanks and process vessels for the chemical, petroleum and food processing industries. Several committee members oppose the issuance of any limitation order on the tankmaking industry as unnecessary now.

But the fabricated metal pipe makers will probably be controlled in a few weeks. In January a committee from the industry met with NPA officials to discuss a proposed order that would impose a priority system on production of fabricated alloy and heavy-wall carbon steel piping.

Under the order, the industry would submit detailed data on large orders to NPA, giving sizes, specifications and tonnages. NPA would then decide whether certain projects would move ahead sooner than others. The pipe fabricators are slated to meet again this month with NPA to thrash out the proposed order before it is issued.

The pipe makers told NPA that their shops are running at 65 to 70 percent of capacity because they haven't been allotted enough material. They're having a tough time placing orders at the steel mills.

Stainless steel is short. Steels containing a high percentage of nickel, cobalt, columbium, tantalum, molybdenum or tungsten are in great demand for aircraft and other engines.

As far as nickel goes, stainless steel producers can expect "no worse" treatment from NPA during February and March than they got in January. The world nickel supply will be improved somewhat during the first half of this year with the reactivation of a producing facility in Cuba. But NPA warns that nickel and stainless steel users should not rely on this source until after mid-year.

Columbium supply has improved during the past few months, and supply of manganese is not considered critical by NPA. Efforts are being made to increase production in the U. S. Silicon supplies are no real problem at present either, according to NPA. Cobalt supplies in the fourth quarter of 1951 ran higher than in the third quarter, but this doesn't guarantee continued supply.

HIGHER TAXES Threaten Sound Financing

One of the biggest problems that mobilization poses for chemical-indeed for all-companies is how to keep net profits after taxes abreast of sales. Just before Korea, the U. S. Treasury was taking around 40 percent of corporate profits. Since then Congress has voted three new rounds of taxes. And now the government bite into profits has soared to 55 percent.

This means that chemical companies, despite their rapidly expanding sales, will frequently, find that left-over earnings are dropping, often sharply. All things being equal, it would take a 33 percent jump in sales, just to keep net at the pre-Korean level. But an added trouble is that all things aren't staying equal: cost increases are outstripping sales, squeezing margins. The industry must run even faster just to hold its own.

The heavy tax burden also comes at a time when competition in non-defense items is rugged and defense orders don't always fill the gap. Moreover, chemical companies are now financing their own expansion; the last time the tax burden was this great—during World War II—the government built the plants.

But there are limits to the extent to which sales can be pushed, and there's a limit to the volume of government orders that can be obtained. So the greatest scope for action to keep up net lies in a business's internal policies. Here are some of the things that can be done to preserve margins:

Cut costs—or at least keep them from rising. These days there's a temptation to spend freely, since the last dollar earned is worth only about 30 cents after taxes. But 30 cents is still 30 cents and extravagant habits are hard to break.

Put more profits into wage incentives to boost both production and productivity.

Spend more on research now. This is long-run but it will save later, when taxes may be lower and savings would mean more. In addition, research could yield new products to boost total volume.

Put in new labor-saving equipment—even though higher taxes could cut deeply into the savings from the machines.

Borrow capital wherever possible since interest is deductible as a business expense.

Of course, decisions to follow policies such as these could, in some cases, be unwarranted. Indeed, there's real danger that the current high tax load will gradually push industry into unsound decisions on financing and expansion, for example. Beyond this, there's the danger that depleted earnings will be insufficient to finance a healthy level of expansion.

ANTI-MONOPOLY Bigness Is Needed Now

The heat is off anti-trust for the duration. Emphasis now is on expansion—anti-trust has to take a back seat. Witness how the mobilizers overruled the anti-trusters by giving Anaconda, already a giant in copper, a foothold in aluminum, in which only three other companies are now producers. The government is even giving fast tax writeoffs to many companies that have lost anti-trust suits. In fact, the government is pretty much confined to carrying along suits already in the courts and to following up decisions won.

That's the situation with the biggest chemical case in the works to-day—the Du Pont-ICI verdict won by the anti-trusters back in October. So strongly was the verdict worded in favor of the government that the federal lawyers are likely to get much of the "relief" they are asking.

This includes: (1) compulsory licensing of a big block of Du Pont patents, some royalty-free and some at "reasonable" royalties: (2) mandatory divulging of Du Pont's knowhow to companies taking out a license; and (3) split-up of companies jointly owned by ICI and Du Pont, and ICI and Remington Arms.

ALIEN PROPERTY Wiley Investigates OAP

A once German chemical firm, General Dyestuff Corp., selling agent for General Aniline & Film Corp., both now held by the Office of Alien Property of the Department of Justice, is trying to speed disposal of OAP's holdings.

General Dyestuff is one of 20 chemical firms still held by OAP. The speed-up in disposal is coming at a time when Senator Alexander Wiley is showing considerable finterest in the firm and is building up an investigation of Alien Property.

He became interested in the holdings of the late Ernest Halbach, a U. S.-born resident of New Jersey. In 1942 OAP took over Halbach's interest in the corporation on the ground that he was a front for Germany's I. G. Farben. Halbach sued the government for return of his property and the case was compromised "with prejudice." This meant he settled for good and promised not to reopen the case. But after Halbach died his heirs reopened the case to try to collect the full market value of the stock.

Senator Wiley offered an amendment to the joint congressional resolution to end the war with Germany that would have nullified the "with prejudice" clause of the Halbach settlement and make it possible to reopen cases like Halbach's. The amendment was beaten, but Wiley has now introduced a separate bill to accomplish the same purpose. The investigation that he is now engaged in is part of a build-up for the amendment.

As a first step he asked OAP last October for reports on the administration of the 10 largest corporations it holds. By December 21 Attorney General J. Howard McGrath had transmitted all reports to Senator Wiley. Included was information on General Aniline & Film, General Dyestuff, and the Schering Corp.

The reports show reasonably high salaries for officials of the firms. For example, Jack Frye, president of GAF, is listed at \$72,000 a year. These salaries are what Wiley is talking about when he charges that the firms under OAP are a "gravy train" on which "a few individuals are growing fat from legal fees and salaries."

OAP's legal fees from 1942 to last June totaled \$1,611,300. Senator Wiley charges they were paid to lawyers identified with the Administration, either as former officials or Democratic party contributors.

Although the Office of Alien Property has done well financially with the firms entrusted to its care, it won't escape a thorough going-over. Wilev's arguments will deal with the OAP's delay in disposing of the firms and with the fees paid for legal services. OAP will counter that legal matters, particularly patent rights, have held up offering the firms for sale, and that the legal work had to be done by the government-held firms just the same as if they were privately run.

Schering to Go at Last?

The government, at long last, seems ready to dispose of its second biggest business holding: the Schering Corp. of Bloomfield, N. J., held by the Justice Department's Office of Alien Property. Within 60 days or so after the Justice Department files with SEC its offering of the 440,000 shares of Schering it controls (100 percent of the outstanding stock), the once German-controlled company should pass to private American ownership.

Today, Schering is a going concern, a leader in the hormone field and a money maker. Since April 1942, its asset value has increased 425 percent to around \$13.5 million. The company's patent holdings once were enormously valuable.

The biggest firm seized as alien property—the \$125 million General Aniline & Film Corp.—probably won't get the Schering treatment yet.

OTHER DEVELOPMENTS PHS to Act on Pollution

Federal efforts to abate pollution of the nation's streams will become more practical in 1952. The U.S. Public Health Service, charged with carrying out the provisions of the Water Pollution Control Act of 1948, will have to make an accounting to Congress when it comes up for more money this spring. Under the act, the federal government had five years to see what it could do, and fiscal 1953 marks the fifth year.

Groundwork for an action program has been laid. PHS has put out reports on the major river basins of the country. They point out where the pollution is and who is responsible. A joint effort of federal and state agencies, these reports are a velvet-gloved warming to municipalities and industries on the offending rivers. Next comes the clean-up.

PHS was able during 1951 to reconcile a number of water pollution problems involving municipalities and industries and the state health authorities, in each instance without fanfare or court action. That's the way the agency prefers to operate. But it has the power, with the consent of the state where the pollution is found, to take a city or a firm to federal court. And now with the river basin reports out, action is imminent.

Chemicals in Foods

Its hearings concluded, the Delaney committee is readying its report, will doubtless recommend, probably in March or April, a tighter federal law. What's expected is a proposed new foods section similar to the new drugs section of the present law, with the FDA empowered to enforce it.

The FDA already has all the power it needs to control the use of chemicals in foods, the Manufacturing Chemists' Association contends. But the MCA does recommend that any new legislation require a 60-day notice to the FDA before any new use of a chemical additive in a food. Meantime the National Research Council's committee on food protection has flatly stated that chemicals used in foods haven't endangered health.



Days Of Manpower Austerity Arrive

Labor is tight, technical manpower even tighter. In the years ahead, the engineer shortage may limit industrial progress. Trends show chemical industry entering a new era.

Today the manpower situation in the U.S. poses an unusual problem—if not a unique one. Like most countries engaged in rearmament, the U.S. is short of trained workers and specialists; but unlike them, its labor reserves are dwindling:

In 1951 employment climbed to 62.6, and unemployment stood at 2 million, a rock bottom minimum. Yet the demands for labor grow: This year the defense program will need 2.5 million more workers; and the needs of the armed forces for young men continue to mount.

The general scarcity will hit the chemical industry hard this year—in the years ahead even harder. Today in the industry, labor is tight. And as the industry catches up on its defense schedules late this year, the squeeze will become more severe.

Fortunately, the chemical industry does not require a labor force as high as other large industries. So when peak expansion comes in 1953, the labor pinch should ease.

But real trouble will come from shortages of skilled labor, particularly technically trained manpower. The industry, for example, needed 5,000 chemical engineers in June 1952; it got 2,800. This year it will want even more; it will get 3,000. No relief is in sight.

"In the next four or five years there probably will not be enough people with technical training to run our industry," President Jess Davis of Stevens Institute told a recent audience in Montelair, N. J.

Several trends, developed over the past year, starkly illustrate the condition today of the chemical manpower market. In union activities, rivalries are growing, wages are still climbing and strike potentialities increasing.

In the field of personnel, workers are becoming scarce, engineers even scarcer, employment grows, better jobs are available and more students are enrolling in engineering courses.

The trends point to an increased call for all kinds of manpower, and to the consequent high premiums placed on it. The days of austerity are here. And the chemical industry enters a new era in which the shortage of technical men will be a major controlling factor—if not limiting factor—in any future expansion plans.

UNIONS Rivalry Growing

Rivalry among unions continues to plague chemical employers, and will probably become more intense. Instead of getting together, chemical unions—especially the three big ones, District 50 and the AFL and CIO chemical workers—are pulling farther apart.

Labor unity looked rosy when the AFL and CIO joined hands in the

United Labor Policy Committee. But that was short-lived. The AFL reversed its stand and broke up the committee. As a result CIO and AFL chemical unions squared off at each other, and District 50 as well.

First to get hurt in such a fracas are the unorganized chemical plants. Other companies with union contracts will find a rival union trying to take over when contracts expire.

Those dealing with District 50 will be particularly vulnerable. District 50, since it has not complied with the Taft-Hartley's anti-Communist oath requirement, cannot get on a National Labor Relation Board election ballot.

All three of the big chemical unions are anti-Communist. But District 50, which occasionally follows the Communist line, is opposed to wage controls. Result is, the AFL and CIO unions are stuck: they will have to show they can get some action even under wage controls.

Meanwhile the industry expands and the unions grow with it. Today the AFL International Chemical Workers claims 112,000 members; the CIO United Gas, Coke & Chemical Workers, 80,000; and District 50 of the United Mine Workers, 200,000, of whom about 100,000 are in the chemical field. As workers become harder to get, the unions will become harder to please.

Wages Still Climbing

Chemical wages, like those in other industries, went up in 1951, and the trend should continue in 1952. Big

factor in the pay struggle, of course, was the controls slapped on wages on Jan. 25, 1951. They slowed the rapid rise after Korea, but did not then it.

During 1950, before the freeze, average hourly earnings in manufacturing rose from \$1.41 to \$1.54, while those in chemicals went up from \$1.45 to \$1.57. Last year, under wage controls, hourly earnings in manufacturing had, by November, moved upward another 8 c. to \$1.62; chemical wages had gone up 7c. to \$1.64.

cal wages had gone up 7c. to \$1.64.

General policy is to let wages rise with the cost of living. Under wage-price controls, living costs went up about 4 percent during the year. The rise in 1952 will be at least that

much, probably more.

However, other wage adjustmentsfor ment, length of service, promotions and discrepancies of pay that
may exist within a plant or between
competing plants—are permitted. In
labor-scarce areas, where needs of defense production require it, wage
incentives will be used to attract and
hold essential workers.

Fringe benefits are also permitted, and they are on the upswing. Right now the most common are paid holidays and vacations, pensions and health and welfare benefits.

In January, wage controls had only an outside chance of lasting through the year. Much hinged on the basic steel wage negotiations and ClO President Philip Murray. Also a threat were the left-wing unions kicked out of the ClO (none in chemicals) who had organized a drive, including picketing, to break the wage freeze. But when the steel workers changed their minds about striking, the dust died down.

Strike Potential Rising

The outlook for 1952 is for an upturn in strikes. Employers, because of the squeeze on profits, are resisting any wage increases; a loose wage policy is stimulating union demands; and unions are stepping up rivalties and organization drives. Such facts point to growing labor troubles.

However, key to any strikes may be the action taken by the steel workers. A walkout by the CIO's steel workers would open the gates to a flood of strikes in other major industries.

But on the bright side, the trend of chemical strikes dipped sharply in 1951. By December the industry had less than half of 1950's 96 strikes. Comparisons between strikers involved and between man-days lost show even a better record.

Last year, defense officials lost little

sleep over chemical strikes. Only headache was the month-long strike at Durez Plastics & Chemical Co., North Tonawanda, N. Y., by the left-wing United Electrical Workers. It caused some shortages of phenol and phenolic resins.

Some of the bigger strikes included: Sherwin-Williams — 1,300 CIO chemical workers struck at the company's Chicago plant for 20 days before they settled for a 15-c. hourly

increase

Monsanto—A 12-day strike by 1,400 CIO electrical workers at the Spring-field, Mass., plant ended when the company dropped a \$675,000 damage suit against the union and set up acceptable disciplinary procedures.

Colgate-Palmolive-Peet-A strike by salesmen idled 2,500 production workers for 10 days at the Jersey City

plant

Although 1951 was a calm year, the no-strike trend need not continue. Today, government pressure, public opinion or patriotic fervor hold back a rash of strikes. But union leaders are not blind to the facts of the labor market. The premium on the working man goes up, and an armistice in Korea or political withdrawal by Russia could set off a lot of fireworks.

PERSONNEL Labor Pool Drying Up

Defense production should reach the high-level mark late this year or early in 1953. The labor market, tight in 1951, should get even tighter as 1952 moves along.

This year 2.5 million more defense workers will be needed to bring the grand total up to 8.5 million. With unemployment under 2 million—near an irreducible minimum—the extra workers will have to come largely through the shifting of workers from non-defense to defense jobs and through greater use of women, the handicapped, older workers and part-time workers.

Besides technical personnel, the greatest shortages are clerical and skilled workers. Such shortages have hampered defense production. To alleviate the problem, the government hopes to increase training programs, defer certain college students and dilute skills on particular jobs.

The government could turn to compulsory manpower controls or possibly relax minimum work standards. But it won't. For this year at least, there are no such plans.

Helping somewhat, are voluntary committees, run by regional and area labor-management manpower groups. They are encouraging the shifting of workers and see to it that seniority and pension rights are protected.

Military calls are drawing heavily from the labor pool, and the big pinch is vet to come. Manpower in the armed forces is expected to hit low tide in 1953; so it is certain draft calls will be upped during the year. And standards will be lowered. Selective Service Director Hershey will get his men by drafting young fathers, lowering physical and mental requirements, and raising the passing grade for deferment of college students from 70 to 80.

Engineer Demand Rising

Every trend points to a continued shortage of engineers. Right now, the chemical industry could use 3,500 to 4,000 chemical engineers a year. It could use about 2,500 engineers of other types each year. Just to staff the expanded facilities completed last July, 29 member companies of MCA needed 3,000 engineers and scientists, 15 percent more than the 20,216 on the early 1951 payroll.

Last June, the chemical industry could have taken 5,000 chemical engineering graduates. But only 3,800 graduated, and only 2,800 of these were available to industry. The rest were called to service, either by the

ROTC or the draft.

All companies, large or small, have their manpower headaches. The problems of a few major ones are typical:

Du Pont, with 4,600 engineers and 3,200 scientists in its employ, could get only 350 of 600 engineers and 300 of the 550 scientists it needed last June.

Union Carbide, with about 4,431 technical graduates on its rolls, was able to sign up but 330 of 467 engineers and 78 of 157 scientists it

wanted.

American Cyanamid, with 878 engineers and 830 scientists, wanted 125 new engineers and 97 scientific graduates; but it got only 84 engineers and 78 scientists.

The situation is so critical that two of the biggest chemical companies are actually considering importing engineers from England. Today, the cost of hiring a technical man is about \$2,000. At that rate, these companies figure it may pay—it may even be necessary—to go to England for engineers.

The shortage of engineers is not confined to the chemical industry. To-day, the Engineering Manpower Commission of EJC estimates, around 40,000 engineers are needed each year to meet military and industrial de-

mands. Rock-bottom estimates of industrial demand for engineers, Defense Mobilizer Wilson and the Labor Department agree, is about 30,000 a year, more than 10 percent of them are chemical engineers. But there are only about 43,000 chemical engineers in the whole United States today.

Getting new engineers, who are needed as replacements for men who die or retire and to fill about 22,000 new jobs each year, is far from easy. Last June, for example, 378 companies and governmental agencies surveyed by EJC's Manpower Commission were able to get only 9,838 of the 21,964 engineering graduates they wanted from the 1951 crop. They already had 127,972 engineers on their rolls.

The outlook is almost equally dismal for chemists, physicists and other scientists. In the same survey, responses from 102 companies and government agencies indicated that they had been able to land only 1,188 of the 2,203 newly graduated scientists that they wanted. These organizations, which again did not include Department of Defense establishments or the AEC, had 15,888 scientists in their employment when they entered the market for 1951 graduates.

The future is not bright. Current demand for engineers is close to 60,000. The 378 companies and agencies surveyed last June needed about 80,000. Graduates in 1951, originally estimated at 38,000 may have been closer to 42,000. Even so, about half were siphoned off, via ROTC, reserve

calls or Selective Service.

The engineers graduating in 1952 will be only about 26,000, in 1953 an estimated 17,000, and by 1954 a paltry 12,000. Russia, in the meantime, is reportedly training young men as scientists and technicians at the rate of about 100,000 a year, about half of them engineers.

Callback of reservists in the last few years has pulled out many technically trained men from industry. And early in 1951, a spot check of member companies of MCA, which together produce 90 percent of the basic chemicals made in the U. S., disclosed that 21.6 percent of their technical employees were in the reserves and subject to recall at any time.

Employment Is Up

Chemical employment last year followed the upward trend generally experienced by the country, without layoffs due to reconversion or material shortages that hit other industries.

Civilian employment in the nation stayed above 60 million, rising from about 60.3 to 62.6 million. In the process industries, total employment edged from 720,000 to 762,000 in the 12 months ending in November 1951. Almost all the rise was in production workers, from 521,000 to 542,000 in the same period.

The labor force in chemicals was more stable than a year ago, and turnover continued to run at only half the rate for all manufacturing plants. Last October, for example, the industry hired 20 and separated 22 for every 1,000 employed.

All manufacturing plants hired 43 and separated 45. A year before, chemical plants were hiring 43 and separating 21 for every 1,000 employed.

Most chemical plants are still on the 40-hour week. Less than 10 percent are scheduling overtime. Thus the average number of hours worked each week in chemicals has changed little over a year's time, dropping slightly from 42 to 41.5 hours. This was still higher than the 40.3 hours for all manufacturing plants, down a whole hour from a year ago.

In a survey in industrial chemicals.

In a survey in industrial chemicals, conducted by the Bureau of Employment Security last August, employment was up 17.8 percent over a year's time. Jobs in plants making inorganic chemicals rose 24.7 percent (some of the gain representing workers who had been on strike the year before); jobs in organics were up 16.1 percent.

Figures reveal substantial employment gains in the past year. With expansions due this year, particularly late in the year, employment should continue to climb. The big "if," of course, is the depth of the labor and manpower pool.

Better Jobs Coming Up

Opportunities both for graduates and experienced engineers are right now bigger and brighter than ever. Reason: the tremendous demand due to the shortage of engineers since mid-1950, the outbreak of the Korean war and the start of the defense pro-

But war or no war, the demand would still be high. Matter of fact, job opportunities, figures show, have always been good. The ratio of engineers to gainful workers has been increasing steadily since 1890. It now stands at about 1,600 engineers per 100,000 workers, according to Bureau of Labor Statistics. And it shows no sign of leveling off.

Private industry offers the most chance for advancement, if personal choice is any criterion. There are 400,000 engineers in the country, according to the Labor Department's estimate. About three-fourths work in private industry, some 90,000 for federal and local government, and 10,000 teach.

A recent Department of Labor survey comes up with some information on earnings of engineers. Most of the people surveyed were in research. Chemists were the larger group, biologists second, engineers third.

Salaries for all age groups ranged from \$2,990 to \$7,600. The median salary of chemists with Ph.D.'s was \$6,030; of Ph.D. engineers, \$6,960. Salary levels of Ph.D. scientists were highest in private industry. Government was next highest. Pay at educational institutions was the lowest.

Older Ph.D.'s received bigger pay than their younger colleagues, whatever type of employment. But median salaries tended to increase more rapidly with age in private industry than in any other type of employment.

Enrollments Increase

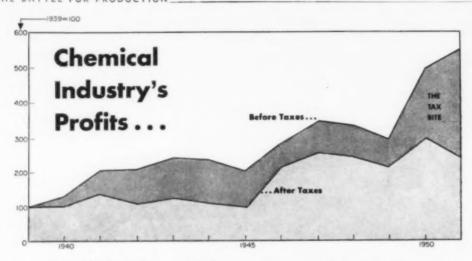
Today more students are registering in engineering schools. According to the Office of Education, freshman engineering enrollment was up 13 percent in 1951 over 1950, despite a 10 percent drop in total freshman enrollment.

But this is still not enough. Something is wrong somewhere. The opportunity for engineers is based, not on hasty conjecture, but solid fact. Either the high school graduate does not care, or has not the means to enter a technological course. More qualified candidates could enter engineering schools; but they are not. One thing is certain, for a potential engineer the draft board is more of a reality than a big job in industry.

No doubt, a large share of the responsibility falls to the government. Either Congress will have to defer engineering students or set up training programs similar to those of World

Industry and educators have asked for such a program. The Office of Education would like Congress to give it authorization to set up something like the wartime training program. As yet, Congress has not seen the need. Apparently, neither has the Bureau of the Budget, which, acting for the President, has to push it.

The U. S. in its industrial war with Russia may be weakened by a shortage of technical manpower, although it has know-how. Russia is weakened by the lack of know-how, although it has vast supplies of manpower. After a number of years, Russia with its highly organized training program might be able to outdo us.



Chemical Profits Wilt as Tax Bite Grows

Pre-tax profits reach a peak—but so do taxes. Net profits stay high, but the chemical industry needs plenty of money to finance its program of new plants and facilities.

Pre-Tax Net Incomes Sour	Post-Tax Incomes Sag
rie-lux riet incomes sour	

	Nine Mor	ntho 2	Nine Mi	
	1950	1951	1950	1951
Abbott Laboratories	\$14,629.0	\$18,101.1	\$8,028.8	\$8,701.1
Air Reduction	11,443.7	14,957.2	5.940.2	5,560.1
American Cyanamid	48,091.7	75,582.6	23,200.0	43,000.0
American Viscose	46,965.0	36,647.0	24.845.0	17.876.0
Bristol-Myers	5,488.2	9,698.0	3,148.4	3,934.3
Colonor	*169.021.9	*170,940.1	29,989.6	22,338,7
Cities Service Co	°495, 993.8	*603.891.4	37,378,3	42.005.2
Corning Glam 1	*90,334,3	*96,165.1	12,298.4	7,899.2
Dow Chemical 1	21,758.8	30,737.7	11,894.1	8.944.4
Du Pent	330,548,0	443,016.6	218,628.0	159.096.6
Eastman Kodak	42,116.9	64,420.0	26,162.9	23,111.1
Glidden 4	7,603.5	11,426.2	4,557.2	5.840.2
Hercules Powder	18,847.8	32,256.4	10.579.1	9,486.6
Heyden Chemical	3,657.0	6,068.4	1,460.9	2,134.4
Industrial Rayon	16,322.6	16,145,2	8,597.6	7,346.6
Interchemical Corp	6,111.7	5,596.2	3,394.3	1,877.5
Jefferson Lake Sulphur	1.185.7	1,391.7	912.7	987.2
Koppers	23,937.8	15,421.1	7,541.9	7,970.7
Libby-Owens-Ford	39,643.4	42,610.4	22.057.2	12.832.5
Lion Oil	18,465.1	14,509.9	10,414.9	8,305.2
Liquid Carbonic 6	3,006.3	4,682.0	991.9	1,812.5
Mathieson Chemical			6,496,6	7,757.0
	11,259.8	18,847.9	13,908.8	16,687.2
Monanto Chemical	38,813.3 29,498.1	50,105.1 33,771.4	13,125.0	17,268,6
National Distillers Nopco Chemical	1,608.2	2,603.4	906.2	856.4
Parke, Davis	22,711.8	34,824.8	11.988.7	12,893.9
		3,859.9	3,952.6	1,548,3
Penick & Ford	2,099.8	*36,776.8	3,136.6	3,149.1
Penn Sait,	*29,617.5 30,493.8	13.062.0	8,224.2	6,777.1
Pfiaer	°25,598,8		2,178.4	2,439.0
Pittaburgh Coke & Chem Pittaburgh Plate Glam		*37,639.0 80,194.2	32,287.8	22,732.2
Rayonier,	13,652.8	24,514.7	9,061.8	8,140.3
Dahas A II		17.798.0	5.497.0	5,340.0
Rohm & Haas Sharp & Dohme	9,884.0 8,509.0	8,430.6	5,127.9	4,691.6
	94,351.7	146,136.0	62,700.3	65,736.5
Shell Union Oil Standard Oil of Ind	77,539.4	122,355.2	52,498.5	71,068.7
Sterling Drug	19,663.2		10,863.2	9,534.2
Sterling Drug		22,834.2 3,220.7	1,600.5	1.069.2
Sun Chemical	2,968.9		20, 208, 0	19,582.1
Texas Gulf Sulphur	29,275.0	30,935.1 208,845.4	99,410.1	76,954.0
Union Carbide	168,417.2		20,811.6	15,272.7
U. S. Gypsum	39,411.6	41,967.7	15.857.2	22,428.9
U. S. Rubber		80,581.4	2,731.6	2,133.2
Victor Chemical	5,002.3	6,056.1	2,731.6	4,180.2

† As thousands of dollars. Data from Moody's. * As net sales. ¹ Net income for 40 weeks. ¹For three meaths to Aug. 31. ² For 24 weeks to mid-June. ⁴ Nine months to July 31. ² Nine months to July 31. ³ Nine months

Last year's chemical profits after taxes were down some 20 percent or more from 1950; sales, on the other hand, were up close to 25 percent.

hand, were up close to 25 percent.

With the exception of 1949, net profits for the chemical industry were the lowest since 1946.

This year both sales and net profits may rise a little—if taxes don't go up again. But the industry's ratio of net to sales may well recede.

Dividends for 1952 will probably hold up well. But look for fewer and smaller year-end extras

Cash Assets Drop

Cash assets for the chemical and allied products industry dropped to \$1.1 billion for the third quarter of last year; at the same period a year earlier they were \$1.3 billion.

At the same time, costs and expenses of the industry rose from \$2.8 billion to \$3.0 billion for the third quarter. Profits after taxes dropped from 11.7 percent of sales to 6.2 percent.

These figures indicate that the chemical industry's cost of operations are going up while its net profits and cash assets are dropping off.

cash assets are dropping off.

This situation has been brought about largely by the tax bite—some \$1.3 billion for the first three quarters of the year.

True, a few companies—such as American Cyanamid, Mathieson and Heyden—had higher post-tax incomes for 1951. But these were exceptions among the strictly chemical firms. Among the big chemical companies, Du Pont stands out with a drop from \$219 million to \$159 million. Dow slid from \$12 million to \$9 million, while Monsanto lost \$2 million to clear a net of \$17 million for the first nine months.

Some of the chemical process industries fared better. Several of the big petroleum firms seem to be the most striking example. Cities Service, Shell Union and Standard of Indiana all made substantial post-tax gains during 1951. The petroleum and coal group as a whole, in fact, managed to up its after-tax profits from 10.5 percent of sales for the third quarter of 1950 to 10.6 percent for the same quarter of last year.

Pharmaceutical firms were also among those that did exceptionally well. Such companies as Abbott Laboratories, Bristol-Myers and Parke-Davis showed some increases in post-tax incomes. Sterling Drug and Sharp & Dohme dropped, thus staying in line with most processing firms.

Chemical stocks continue to lead the industrials by a wide margin.

In 1948 chemicals and industrials both stood at close to 125 (1935-39 = 100). But by the end of last year chemicals had climbed to 240 while all industrials his close to 200.

It's true that most chemical stocks lagged a bit in the market recovery just after the start of the Korean war and again last September. Since early November, however, market action has again been better than average. The long-term outlook is favorable.

This Is the Question

But this dip in profits brings up a basic question:

If taxes remain high and operating costs continue to go up, how long will the chemical industry be able to finance the lion's share of its expansions in new plants and facilities through its cash reserves or retained earnings? For while net profits tend to level off or go down, the cost of new construction has gone up at a dizzy page.

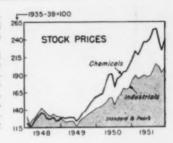
Most of the big chemical companies—the ones that account for the lion's share of new capital investment—still have a healthy cash reserve. And, if needs be, these companies won't have any difficulty at all in raising more money from security issues or long-term loans.

But the small firms—those that get most of their cash from retained earnings or short-term bank loans—may soon be facing a more severe cash squeeze.

It's too early yet, of course, to see

any dropping off in capital expenditures; in fact, this year the chemical industry plans to spend more than ever before (see p. 146).

But the thing to watch is the trend of capital expenditures for the next few years or decade. A decided tapering off may well indicate that the heavy tax bite is reducing the chemical industry to the point that it is less able—or willing—to continue the rapid expansion rate that has always marked it as an outstanding growth industry.

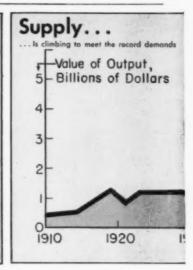


DIVIDENDS hold up well, but year-end extras will be fewer and smaller this year.

			_	-Dollars per Share		
	Dividenda,	Salen,			Year	Net
	Per Share	100 Shares	High	Low	End	Change
Abbott Laboratories	\$1.95°	3,485	62	4136	59	+14%
Air Reduction	1.40	7,200	3136	2496	2016	- 134
Allied Chemical & Dys	3.00*	7,260	7736	88	7834	+1636
American Agric. Chemical	4.50	665	66%	49	00%	+13
American Cyanamid	4.00	9.065	13134	7194	118%	+4634
American Viscose	2.50	4,996	78	5736	65%	+ 2%
Atlas Powder	2.00	1,516	4334	31	39	- 36
Bristol-Myers	1.75	2,728	4016	30	3434	+ 334
Celanos	3.00	8,967	5814	4356	8234	+ 456
Colgate-Palmolive-Peet	2.00		BEL.			- 1
Colgate-Palmolive-Peet		2,814	5514	4216	4536	+ 816
Commercial Solvents	1.25*	11,891	3216	2234	31	
Corn Products Refining	3.60*	2,793	79%	66	70%	+ 236
Corning Glass Works	2.00*	2,472	78	38	7314	+3436
Davison Chemical	1.80	2,429	47	3136	47	+16
Dow Chemical	2.401	8,791	11936	7796	116	+3736
Du Pont	3.55	12,059	10236	82	92	+ 8
Eastman Kodak	1.80*	1,294,140	51%	4136	46	- 36
Ferro Corp	1.60	3,322	3954	1734	3356	+15%
Pirestone	3.50*	896	70%	5434	70%	
Food Machinery & Chemical	1.78	3.448	54	3314	53	+19
Freeport Sulphur	1.834	1.503	4956	261	37%	
General Tire & Rubber	3.50=		6034	34	5534	+1936
		4,182				
Glidden Co	2.25	6,822	4834	2794	4134	+13%
Goodrich	2.50	5,873	0634	4236	6154	
Goodyear	3.00	2,643	50	3234	44	*****
Hercules Powder	3.00	2,403	79	62	6036	+ 436
Heyden Chemical	1.00a	5,000	2616	1856	24	+ 434
Hooker Electrochemical	2.00	978	69	4234	59	+15
Industrial Rayon	3.00	1.082	7136	56%	60	- 834
Interchemical Corp.	2.00	2,404	2936	20%	2354	- 94
International Min. & Chem	1.60	7,047	4436	2514	30	+1136
Vonesta	2.50	3,734	4734	36	4536	+ 9
KoppersLibby-Owens-Ford	2.00			3014	3454	+ 316
Landy-Owens-Ford	2.00	6,461	3654	3734		+ 36
Lion Oil		6,481	4634		4134	+ 316
Liquid Carbonie	1.20	2,186	2314	1736	2235	
Mathieson Chemical	1.70	3,988	49%	29	4456	+15%
McKesson & Robbins	2.470	1,760	45	8734	42	+ %
Merck & Co	0.80*, *	3,708	39%	20*	3214	
Minnesota Mining & Mfg	1.00	4,084	84	3734	4834	
Monsanto Chemical	2.50	4,353	10734	73	105%	+3136
National Distillers	2.00	1,552,100	3734	2634	3436	- 636
Nopeo Chemical	2.90	898	80	3534	4534	+ 614
Norwich Pharmacal	1.00*	2,042	2434	1536	3034	+ 316
Owena-Illinois Glass	4.00	346,100	8934	78%	8456	+ 896
Parke-Davis	1.90*	4,703	6334	40%	3734	+1616
	2.00	456		3434	3454	- 3
Penick & Ford			4136			
Pennsylvania Salt Mfg	2.00	748	71	50%	6734	+1234
PfiserPittaburgh Coke & Chem	0.984, 4	5,348	4656	2796	43	*****
Pittsburgh Coke & Chem	1.25a, b	2,948	39%	1934	33	+1256
Pittsburgh Plate Glass	2.00	4,922	8434	3736	4934	+10%
Procter & Gamble	3.00	2,509	80	6234	6634	- 434
Publicker Industries		5,902	2954	1634	17	- 7
Rayonier	3.00	2,386	6436	4536	6256	+1434
Rohm & Hass	1.604	413	100%	9334	142	+44
St. Regis Paper	0.80	21,219	1834	1136	1736	+ 516
Schenley Industries	2.00	11,217	4134	3136	3234	- 516
	1.80		40%	37	4434	+ 216
Sharp & Dohme		2,921				
Shell Oil	3.00	4,656	70%	51	69	+1416
Bquibb	0.95	3,111	2956	1834	2634	
Standard Oil N. J Sterling Drug	4.12*, *	15,650	75%	4594	7894	
Sterling Drug	2.254	3,423	4734	3636	39%	+ 436
Sun Chemical	0.78*	2,708	1236	934	1034	- 36
Sun Chemical Texas Co. Texas Gulf Sulphur	3.05*,*	8,224	8934	4434	8636	
Texas Gulf Sulphur	5.50*	3,081	119	90%	10034	+ 514
Union Carbida	2.50	1,164,850	6654	53%	6356	+ 834
Union Carbide	2.50	1,513	6534	4436	6334	+15%
Visited Caroon.	7.00*					
U. S. Gypeum		2,006	194	10436	10636	+ 4
U. S. Ruober	6.00	9,016	80%	81	7734	+2634
	1.20	1,199	2814	2834	2436	+ 36
Viek Chemical			3436	234	2334	
Victor Chemical	0.92*,*	717	0.478			
Victor Chemical Virginia-Carolina Chemical	****	8,595	2836	10%	2734	+1636
Victor Chemical. Victor Chemical. Virginia-Carolina Chemical Vialting Corp. W. Virginia Pulp & Paper.	1.504		2836			+16% + 8%

^{*} Includes cash extra. * Plus payment in stock. * Equivalent on new stock.

Industrial chemical con	1939	1945	1950	1951	195 VI 195
TOTAL	124.15	187.62	251.69	273.26	+8.4
Fortilizers		42.21	54.61	56.38	+3.2
Pulp & Paper	16.52	19.44	26.70	29.70	+11.2
Glass		19.64	20.81	23.24	+11.7
Petroleum	13.45	18.71	22.57	25.55	+13.2
Paints & Varnishes	10.66	17.37	25.76	28.57	+10.9
Iron & Steel	8.21	11.96	14,64	16.12	+10.1
Rayon	9.08	18.38	30.37	34.07	+12.2
Textiles	7.89	10.30	11.32	11.94	+5.5
Coal Products	7.17	9.41	10.34	11.12	+7.5
Leather	4.16	4.54	4.35	4.01	-7.8
Industrial Explosives	4.53	5.36	8.39	8.42	+0.4
Rubber	2.79	4.55	6.03	6.25	+3.6
Plastics	2.05	5.75	15.80	17.89	+13.2



Chemicals Are Closing Supply-Demand Gap

Output goes up to reach a new high; it'll go up more this year. Meanwhile, demand is leveling off on a high plateau. By this time next year many more chemicals will be in balance.

You can't pile the demands of a quick mobilization program atop those of a lusty peacetime economy without throwing the balance between supply and demand out of joint.

The chemical balance was out of joint last year, and for that reason. But let's take a look at what happened and what's likely to happen this year and the next.

BUSINESS

Look For A Rise

The business outlook for 1952 is bright but not blinding. That's the judgment of McGraw-Hill economists, assuming that World War III won't break out.

Industrial production may rise as much as 8-10 percent by year's end. That would push the Federal Reserve Board's index from its present level of 218 (1935-39 = 100) to a new peacetime high.

Gross national product – the market value of all goods and services produced – is likely to rise 6 percent over the present \$330 billion level. The general price level probably won't go up any more than 2-3 percent.

The two big forces that pushed 1951 to a year of generally good busi-

ness were the high level of defense spending and the record volume of expenditures by industry for new plants and equipment.

Government defense spending at the end of 1951 was at an annual rate of \$44 billion. Add to this the \$5 billion spent for materials by private producers just starting on defense work. And industry's capital spending zoomed to a record-breaking \$18.7 billion.

Defense spending during 1952 will rise about \$1 billion a month to approach an annual rate of about \$60 billion by year's end – a comedown from the earlier \$70 billion estimate. But private industry capital expenditures will stay high (see p. 146).

The more moderate level of defense spending may mean that some businesses are in for a surprise. No longer is it certain that the defense program will generate enough activity to keep all industry segments operating at peak

Consumer goods, too, may be affected by the toning down of defense activity although it's more likely that the slow climb in total consumer spending will continue through the year. Consumers have the money to spend, for they're now saving about 10 percent of their after-tax income;

4 percent was typical of postwar habits.

But keep in mind that the November elections are certain to inject a political element into the economic outlook. You just don't find business let-downs in the second half of a presidential year!

Finally – looking over the horizon – watch for competition to return to more and more segments of the economy in 1953.

Inflation Has the Edge

Both inflationary and deflationary forces are at work in the economy

If consumers show restraint or if there's a slowing down in the mobilization program, prices will soften.

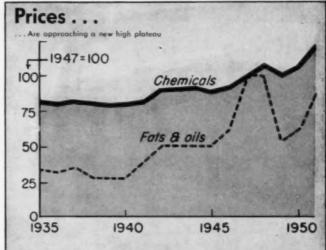
If wage negotiations in steel mean an end to the wage-price control program, another surge in prices could come. The Treasury's deficit of about \$10 billion in the second half of 1952 will be another inflationary factor.

Right now it looks as if the upward pressures will be stronger – but not by much.

CPI Look Forward

Most of the process industries can look forward to a year of growth. But there are a few soft spots in the outlook. Basic chemicals will have, by and large, another year of emphasis on boosting output.





The steel industry has been producing at an annual rate of 108 million ingot tons compared to a pre-Korea rate of less than 100 million. Additions to rated capacity now in the works will boost the potential to 120 million tons by 1954.

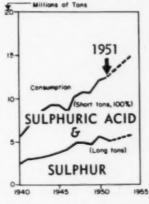
But if the defense program operates on a middle course, Washington officials may find that they have exaggerated steel needs. Certain types of steel products are certain to be in tight supply for some while. But doubt about the future is reflected in the fact that some industry leaders are musing out loud about a possible steel surplus late this year.

Petroleum refining capacity is scheduled to rise from the present level of 7 million barrels a day to 8 million by the end of 1953. And oil well drilling is on the rise, too.

But the tight supply picture in oil may not extend through the year. Increased world output completely offset the loss of Iranian supplies. And if Iranian oil should start flowing again, it's virtually certain that the oil industry will feel some slack.

The rubber supply has improved. A good deal of the credit must go to the synthetic producers. They have boosted output to 67,000 long tons a month. As recently as last April synthetic production was under 50,000 long tons a month.

While some restrictions on rubber use will be eased, many others will be kept and some even tightened. The government will seek increased output of synthetic rubber all during 1952.



Plenty to Worry About

One of the most thorny shortages the chemical industry faced last year came from the sulphur gap of some 1.4 million long tons between what was available and what was needed.

Since this gap was only a little more than our exports of about 1.3 million tons, domestic sources could have come close to meeting our own needs. But we had to send sulphur abroad to help in re-arming the free world. The shortage forced us to allocate exports and to hold down our domestic consumption.

This year the gap will be greater: some 1.75 million tons, estimates the International Materials Conference. This is in spite of the fact that we're increasing our sources of sulphur and its alternates in all directions: native sulphur, brimstone from H_sS, pyrites, byproduct acid from smelters, acid direct from H_sS – even a little sulphur from low-grade ores.

We already re-use over 2 million tons of waste acid a year, which helped to bring last year's total available acid to a record of about 14.7 million short tons. The 1951 output of new acid was close to 12.6 million tons.

It's Possible, But . . .

Some estimates – especially those put out in government circles – indicate that we'll probably be able to strike a balance between sulphur supply and demand in 1953. That's possible – but don't bank on it if demands keep on growing at the rate now indicated.

In 1951 our total sulphur supply from all sources was about 6.4 million tons; NPA puts the 1950 total at almost 6.1 million. But for 1953, OPM estimates the demand will reach 7.22 million tons.

It's possible that the end of 1953 will see a new capacity of something like 1.6 million tons from all sources if present plans are carried out (see Sulphur Report, Chem. Eng., January 1952, pp. 165-176). Yet this cannot be added directly to our present capacity, since the output of some of the older Frasch mines will taper off. Besides, some of this new capacity won't come in until well along into 1953. If we do reach ODM's goal in 1953, it'll probably be by the route

indicated by the accompanying table.

Output of elemental sulphur from H,S in sour natural and refinery gases is going up fast; nine plants are now operating and by 1953 there'll be a total of 20 or more. But this source cannot be expected to yield more than about 10 percent of our supplies in the foreseeable future.

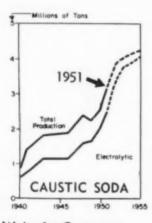
Our pyrites supplies, counting imports, are virtually unlimited. And much more acid could be recovered from smelter gases if only it were possible to make economical use of it. Eventually, though, we'll have to expand both of these sources as well as get more sulphur from the unlimited supplies in coal.

Before many years we may also have to follow the lead of Europe and start making sulphuric acid from gypsum and anhydrite.

Where Our Sulphur Comes From

	1949	1950 (Per	1951 cent)	1953
Mined sulphur Has sulphur Imported pyrites Domestic pyrites Smelter acid Acid from Has Total supply.	86.9 1.0 1.1 6.9 3.4 0.7	85.3 2.3 1.6 6.3 3.9 0.6	82.9 8.1 1.8 6.7 4.5 1.0	80.5 6.3 1.8 6.2 4.2 1.2
million tens	5.45	6.09	6.40	7.23

All estimates are on the basis of S equivalents,



Waits for Customers

Caustic soda's claim to fame right now is that you can buy all you need. And as the caustic supply keeps on building up with the expansion in electrolytic chlorine, the day when it threatens to become a drug on the market already haunts producers.

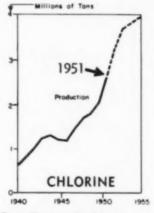
This oversupply situation can be postponed, but it seems inevitable. Factors that can delay it are the development of better processes for making chlorine without caustic, the

gradual shutting down of plants making caustic soda from soda ash, and the development of new and diversified uses.

The demand side of the picture doesn't look much better. Viscose rayon and cellulose film, major caustic consumers, will no doubt continue to grow—but at a pace slowed down by competition from other synthetic fibers and films. The use of caustic by the soap industry has already suffered setbacks from synthetic detergents.

Although caustic price is now steady, price cuts would help stimulate demand. Some alkali-consuming processes can use either caustic or ash. And right now caustic is more expensive per unit of alkali than ash.

A price cut in caustic would also help to even out the supply-demand situation. It would have to be offset by an increase in chlorine price. This, in turn, would step up interest in new chlorine processes that're now economically marginal.



Sees Future Problems

Chlorine has been vying in recent months with sulphur and benzene for its share of shortage-inspired headlines. But unlike sulphur and benzene, chlorine can be easily expanded along conventional lines—if the construction materials, electric power and capital are all available.

From the long-term look, the economic factor is the most significant one. At current prices of chlorine and caustic soda and in the face of rising construction and operating costs, investment of new money in chlorine facilities isn't exactly a gold mine. The best way to make a profit with chlorine, it seems, is to upgrade it into chlorine-based derivatives.

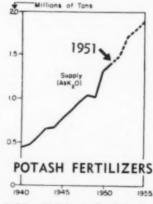
Markets for chlorine and it deriva-

tives, to be sure, are fairly certain and are still growing; we are desperately trying to overcome the shortages. The big question, then, is what to do with the caustic. This might soon get to be a nasty problem if you use your own chlorine but must sell your caustic.

These dark prospects are brightened a bit by the certificates of necessity being granted for fast write-offs. Yet chlorine output is going up fast—close to 2.5 million tons last year as compared with 2 million in 1950. And when currently projected capacity all comes in, probably some time next year, we'll be able to turn out better than 3.5 million tons a year.

Where does all this chlorine go? Large amounts go to the pulp and paper industry. Most of the rest (better than 75 percent of the total) is used to make a host of chemicals from acrylonitrile to zirconium tetrachloride. A detailed breakdown is almost impossible. Some of the larger uses are for tetraethyl lead, ethylene glycol, pesticides, neoprene, vinyl chloride and chlorinated solvents. The total demand, now estimated at 10,000 tons per day, will probably outstrip the supply for several years.

Chlorine price remains unchanged over 1950 at \$54 per ton; 1949 price was \$48. Under more fluid economic conditions, chlorine price would surely rise to reflect the true supply-demand picture.



Add a Fifth at Carlsbad

Last year's supply of potash—domestic production plus imports—came to about 1.4 million tons of K₂O. About 90,000 tons went to the chemical industry, the balance to agriculture. This year's total supply will tally up to about 1.5 million tons.

Potash imports were substantial last

year. Were it not for these, the supply would have fallen far short of the industry's needs. U.S. production grew only about 8 percent between 1950 and 1951; this year it will inch up another 4 or 5 percent.

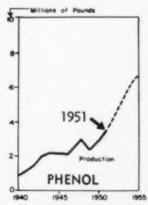
Several changes in the make-up of the industry have taken place recently. Mathieson bought the stock interest in American Potash & Chemical which had been held by Hevden. Mathieson intends to merge this potash business into its main setup.

Duval Sulphur & Potash Co., now the fourth potash producer in the Carlsbad area, shipped a small amount near the close of the year. But Duval's share of the 1952 output will probably not go above 100,000 tons of potash chemicals and minerals, despite its program to develop immediately three times that capacity.

Carlsbad's fifth producer will be Southwest Potash Co., controlled by American Metals Co. But it won't be in production until late 1952

Meanwhile, the K1O content of mixed fertilizer keeps rising. Last year's average made up about 9 per-cent by weight of all mixtures. This year it may reach 10 percent. Extensive substitution of 3-12-12 for 2-12-6 means that the ratio of potash to phosphate will double for one of the most used mixed fertilizers.

The pinch on phosphates emphasizes this trend. So even though our over-all fertilizer production might well shrink, demand for potash itself for the next several years will most likely exceed the increased supply.



Sees Little Relief

Last year's output of phenol came close to 350 million pounds - some 3.5 times what was turned out in 1940. This year the tally should be

higher, but phenol-hungry industries will feel little relief for another eight months or so.

Reason for this is that the lack of steel is holding up much of the new phenol capacity once slated to come in this year. But by year's end new facilities ready to go on stream should jack up the output rate to about 450 million pounds yearly. By 1955, the nation's phenol capacity should top 620 million pounds a year.

Benzene raw material won't be quite so hard to get this year - but it'll probably cost more. Several new plants that'll use cumene instead of benzene will be ready to go on stream

in 1953.

Back of this surge in phenol capacity is the sharp growth of the phenolic resins, especially phenol-formaldehyde and modified phenolics. The total output of phenolic resins now tops 400 million pounds annually; in 1940 it was less than 100 million

Close to 40 percent of our phenolformaldehyde resins now goes into military uses: electrical equipment, planes, tanks and other war goods. This naturally puts a squeeze on civilian uses. An all-out emergency could quickly hike this 40 percent to almost 100 percent.

Meanwhile, it's expected that huge new tonnages of phenolics will be needed in making foundry molds and for bonding wood wastes. The petroleum refining industry has also been upping its demands for phenol, particularly for processing heavy-duty lubricating oils.

Although the supply of phenol will soon go up fast, the demand will go up just as fast. So during the first half of this year you can expect phenol to be just about as tight as last year.

The high cost of petroleum-base benzene (close to 55 cents per gal.) has put pressure on phenol prices. The prevailing quotation is now 20-21 cents per lb. (13.5 cents at the end

One bright spot in the phenol picture: resale prices are now down to about 29 cents - a sharp drop from early last year.

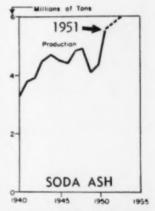
METHANOL Looks to a Firm Future

Estimates of last year's synthetic methanol output tally up to some 179 million gallons. That's 32 percent more than for the previous year and 270 percent above 1940's figure. Production of wood distillation

methanol, as in past years, was spotty. Most of it was sold as anti-freeze.

Since methanol and ammonia production units are easily interchangeable, it's tough to predict methanol capacity or potential without bringing in political factors. Defense plans are now shooting for a nitrogen capacity by 1955 that's almost 100 percent over what it was at the start of 1950. If all of it isn't needed-and some people doubt it-then there'll be a lot of ammonia capacity that can be used to turn out more methanol.

Demand was strong during 1951, both for antifreeze and for industrial uses. Formaldehyde keeps on calling for more methanol; what not with the metal storages and the strong growth of the phenolic resins, this should help keep both demand and price of the alcohol firm for some years to come.



Watches Growth Trends

There were no serious labor difficulties. And since 1951 didn't repeat 1950, the supply of soda ash was adequate. It will continue to be so for three good reasons:

Expansions such as Solvay's at Baton Rouge will provide additional

New plants (such as the one at Westvaco, Wyo.) will raise the country's output;

Conversion of lime-soda caustic plants (Solvay at Syracuse, Diamond at Painesville) will release more ash for other uses.

All but one of the consuming industries estimated by Chemical Engineering took more ash last year. The exception, of course, is textiles where the slump in wool played the major

Glass, largest consumer of ash, bel-

wethered the flock with a jump of better than 400,000 tons. Ash for defense—for aluminum and for export —naturally shows significant increase.

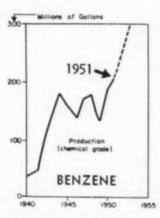
Soda ash producers are watching two growth uses for their product: the semi-chemical pulping process and synthetic detergents. The first accounts for last year's 133 percent increase in the pulp and paper industry. The second uses the ash-made phosphates as builders. And phosphates now account for 36 percent of the ash going into the "other chemicals" total.

Prices during the year remained steady. The advances requested by producers didn't come from Washington—yet.

Where Our Soda Ash Goes

1949 (Thou	1950 ands of	1951 Tons)
1.190	1.225	1.640
875	700	940
210	245	333
200	200	470
125	108	120
130	110	142
110	100	128
5.5	65	5.6
76	50	152
24	24	29
950	1,050	1,253
175	151	287
4,120	4,025	5,550
	(Thou: 1,190 875 210 200 125 130 110 110 55 76 24 950	(Thouands of 1.190 1.225 875 700 210 245 200 200 125 108 120 110 110 125 65 68 76 50 24 25 175 151

A Chemical Engineering estimate. Based on 100 percent Na:COs. Includes modified motes.



Made Organic History

As with sulphur, the benzene crisis flared up suddenly, quickly became world-wide. But unlike sulphur, fast action—this time by the petroleum industry—saved the day.

You can expect the 1952 benzene year to be a happier one; by this time next year we'll be well over the hump of the crisis. The relief will be felt throughout the world's chemical process industries.

In 1950 American industry turned out some 186 million gallons of industrial-grade benzene but consumed close to 208 million gallons. Last year's consumption reached 250-260 million gallons, could have gone much higher. We strained our facilities and scoured the world, but that's all we could get.

Yet by 1955 we expect to be gobbling up benzene at the rate of 400 million gallons or more each year. That's a far cry from 1940, when the U. S. turned out some 37 million gallons of chemical-grade benzene and found use for about 39 million gallons.

Where will it all come from?

Last year the U. S. coking industry came up with all the benzene it could: some 180 million gallons. But the petroleum industry moved fast and was able to chip in another 25 million gallons or so. Imports—close to an annual rate of 55 million gallons by the end of the year—supplied close to 20 percent of the available supply.

We'll have to bank on the petroleum industry to fill the gap. By the end of 1952 it will come close to doing just that, for the output of petroleum-base benzene is expected to climb from its present rate of about 40 million gallons annually to a hefty 90 million gallons by the turn of 1953. If needs be, petroleum refiners are able—and willing—to put up the facilities to turn out whatever amounts are needed.

Meanwhile, since 1940 another major trend—the decline of motor-grade benzene—has become striking. Production of this grade is now only about 5 percent of the nation's benzene output; in 1940 and during the height of World War II it was closer to 80 percent.

Styrene Gobbles It

Styrene for synthetic rubber and plastics is now the biggest U. S. consumer of benzene. Last year styrene gobbled up close to 75 million gallons, expects to get well over 100 million a year by 1955. The styrene market, for practical purposes, didn't exist in 1940; now it's grabbing almost a third of the U. S. benzene output.

Phenol runs a close second to styrene as a gobbler of benzene. In 1940 phenol took about 10 million gallons; last year its take was close to 50 million. And its demand is expected to go up another 20 percent by the end of this year. But by 1953 cumene will start taking some of the pressure off benzene as a phenol raw material.

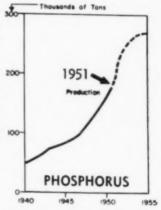
Aniline capacity this year will be

raised to about 135 million pounds. That means aniline expects about 30 percent more benzene than for 1950.

Synthetic detergents, still shooting up, are now taking about 15 million gallons of benzene a year –a 15-fold hike since 1940. Detergent manufacturers want more.

Then there's a host of new chemical markets for benzene that can't be sneezed at. Nylon, for example, takes some 10 million gallons, DDT upwards of 12 million. And benzene hexachloride just about doubled its take this year, bringing its needs to over 5 million gallons.

Also in the race to get benzene are maleic anhydride, the chlorobenzenes, 2,4-D, 2,4,5-T. Most of them clamor for a little (or a lot) more benzene each year.



Makes Inorganic History

Phosphorus is on the rise: output, up from less than 50,000 tons in 1940, now approaches the industry's rated capacity of some 180,000 tons annually. And by 1954 the nation's phosphorus furnaces should be able to turn out over 260,000 tons each year.

This renaissance of elemental phosphorus is one of the most striking in our entire inorganic chemical industries. And with it, the phosphorus industry is shifting westward; Idaho, with three big reduction plants going up or on stream, now ranks above Tennessee as a producer of phosphate rock.

Phosphoric acid is the barometer to watch; very little phosphorus escapes conversion into the acid before it goes into phosphate chemicals.

We are now turning out phosphoric acid (50 percent basis) at an annual rate close to 1,900,000 tons; this year's rate will top 2,000,000 tons an increase of some 350 percent during the past decade. The rise will be steep for several years yet.

Right now, elemental phosphorus is neck-to-neck with the wet process as a source of phosphoric acid. The scarcity of sulphur and the rising cost of sulphuric acid tend to give an edge to thermal phosphoric acid. On the other hand, processes for recovering uranium and thus purifying wet acid shift the balance back again. It's almost certain, though, that the wet process will show new life within the next few years.

Tripoly Leads

Sodium phosphates, now on the crest of a growth surge, are the big consumers of phosphoric acid. And the biggest of these in tonnage is sodium tripolyphosphate, now being turned out at a yearly rate above 375,000 tons—close to 35 percent over last year. The sharp—and growing—demand for tripoly comes largely from the synthetic detergent and water treating fields.

Next among the tonnage sodium phosphates is the dibasic compound. This has shown a more modest increase (close to 15 percent) over 1950, now tallies up to some 175,000 tons annually on a 100 percent basis. Production in 1947 was 79,000 tons.

Last year's record for percentage in-

Last year's record for percentage increase among the sodium phosphates went to meta and tetra. At year's end they were being turned out at an annual rate close to 50,000 tons.

In addition to the growing demand for phosphoric acid for chemical uses, triple superphosphate and fertilizergrade ammonium phosphates are biting off bigger tonnages of wet-process acid. Triple super and ammonium phosphates now supply close to 20 percent of the total P_sO₆ in all fertilizers.

Watch the Organics

And now the higher output of both elemental phosphorus and of chlorine add up to better prospects for a more plentiful supply of phosphorus chlorides in the near future. These are vital to the manufacture of many organic phosphorus compounds.

Phosphorus oxychloride is used to make such compounds as tributyl and tricresyl phosphates. Last year's output of tricresyl (almost 17,000,000 lb.) was up close to 15 percent; demand is still strong.

Thus the long-range outlook for phosphorus remains bright: a strong but leveling off demand for sodium phosphates; a steepening growth curve for organic phosphorus compounds; an accelerated trend toward higher strength phosphate fertilizers.

But the organics, most people feel, are the phosphorus derivatives that'll bear close watching in the future.

Quoted price of phosphoric acid, N. F. grade, has inched up to \$8.25 per 100 lb. At the same time in 1950 it was \$8.00 – a sharp drop from the \$10.50 of late 1949.

COAL CHEMICALS Coke Ovens Strain

Last year's production of the major coke-oven chemicals inched up some 3 percent over the 1950 figure. This corresponds to an increase in coke capacity of about 2.5 million tons a

This year, some 1,000 new ovens should turn out an additional 3.5 million tons of coke. This would step up output about 5 percent above last year's record. And it will mean another inching up in the production of coke-oven chemicals.

But these primary organics are no longer confined to coke oven operations. Production by depolymerization of coal by hydrogenation is just beginning. In fact, that operation by Carbide & Carbon at Institute, W. Va., will probably start turning out a noticeable part of the total in 1952 for some of these chemicals.

Large volumes of these primary chemicals also come from the petroleum industry, already a major source of benzene as well as of toluene and xylene. The trend is clear: within a few years coal hydrogenation and petroleum processing will become major factors in the supply of all aromatic chemicals.

Coke ovens now use more washed coal, which contributes to the increased chemical output. But the water content of this coal is higher, so that the yield per ton of coal charged is less. Yet the washing of coal has apparently offset the previous downtrend in the quality of coking coal. Residual moisture in this coal also helps to raise yields a little by preventing hot tops in the ovens.

Another technological move that increases chemical output is refrigerating the scrubbing oil; this permits more complete removal of light oil from the

Demand for all the major chemicals of this group has exceeded supply during most of the past year. Nor is this likely to change much soon.

No outstanding price trends are evident. The major chemicals are

bumping against price ceilings regularly. Only a few, where new production begins to equal demand, can be expected to show any price softening until defense efforts lessen.

Output	ef	Coal	Creeps Up 1980 1981 Millions of Pounds or Gallons
			Gallons

	7,000	Interes.
Ammonium sulphate From coke-oven NHs From bought synthetic	1,662	1,788
Ammonia liquor (NHa) Naphthalene (crude)	29 46.8 100	49. 6 127
Benzene Nitration (1 deg.) Industrial pure (2 deg.) Other industrial grades Motor grade		44.1 123.1 8.0 5.3
Toluene Nitration (1 deg.) Industrial pure (1 deg.) All other grades Xylene, all grades	22.1 7.8 0.8 8.1	24.7 8.8 0.8 9.0
Solvent naphtha Crude heavy solvent Refined light solvent Coal tar, crude Creosote oil	5.6 0.4 740 33.0	5.4 0.2 792 33.3
Pyridine Crude tar bases (dry)	0.4	0.5

FATS AND OILS Drying Oils Tighten Up

Last year's output of oilseeds was close to a record, so you can look for good supplies of edible fats and oils this year. And 1952 oilseed crops will approach—but not top—the 1951 high levels.

Cottonseed production last year topped the 1950 crop by about 70 percent. This more than offsets the dip in soybean and peanut yields.

Drying oils will get tighter this year since flasseed was down about 18 percent in 1951. Drying oil demand this year may even top production by as much as 50 percent. If so, stocks will be cut to a minimum working level by mid-year. Acreage will probably go up again this year.

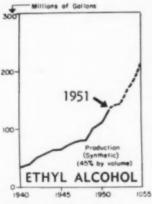
Quick-drying oils will be very scarce. Domestic tung oil will meet 10-20 percent of our normal needs and Argentina will come forth with another 20 percent. But supplies from China have been cut off, and less castor supplies will come from Brazil and India because of reduced production.

Coconut oil will most likely be plentiful. Tallow and grease supplies for soap are expected to be adequate.

On the other hand, U.S. demands for fats and oils—especially for industrial products—will go higher. Last year's total use of fats and oils in drying oil products went up 10 percent; for industrial products it went up about 20 percent. The 1952 figures will probably be even higher.

Export demands will continue strong. Last year they hit a new high of some 2.4 billion pounds for all types of oils. Europe will continue to ask for U. S. edible fats and oils. We will also be expected to supply more flaxseed and linseed oil to fill the gap caused by Argentina's short crop and low surplus stocks.

The general price level in late 1951 was about the same as a year earlier. Prices this year will hinge largely on crop prospects and international developments. Cottonseed, soybean and flaxseed prices will be supported at near the present market level; market prices during 1951 were a little above the crop support levels.



Synthetic Edges Up

Alcohol output in 1951 was around 252 million gallons—an increase of 25 percent over the year before and almost 100 percent over 1940. Imports came to 110 million gallons, mostly for butadiene.

By coincidence – but a coincidence that underlines a trend – the capacity of synthetic alcohol plants is now exactly the same as the nation's total industrial alcohol output in 1940: 128

million gallons.

Besides, capacity for synthetic will go up; present plans call for an increase of 83 million gallons. The total synthetic potential will then tot up to 211 million. The new units should begin operations in early 1953.

Last year some new synthetic production came in. And all synthetic plants ran to capacity except the Fischer-Tropsch plant, which still has trouble getting its stride. But by the year's end fermentation producers were seeing trouble.

At the beginning of the year the demand was firm; all producers marketed without trouble and at high prices. Four factors backed up this firmness: (1) Rubber Reserve bought

large quantities of alcohol for butadiene; (2) foreign demand for molasses in cattle food and for chemicals kept this raw material from becoming a distress item; (3) synthetic plants in the United Kingdom had a lot of bad luck, so that the British were actually buyers instead of producers; (4) domestic business rolled along on a high level.

But by the year's end the alcohol demand had eased, prices softened. Distressed fermenters brought successful pressure on Rubber Reserve to slash their purchases of foreign alcohol. Inventory at the end of 1951 was about 55 million gallons—double what it was more than a year earlier.

Molasses also softened. For one thing, it's pricing itself out of the cattle food market. Then the weather damaged Louisiana's sugar crop; so this was converted into invert molasses and bought as alcohol by Rubber Re-

Then too, the dip in the textile business cut into the demand for acetic acid. Result: marginal acid made from alcohol was curtailed or

discontinued - and more alcohol was released.

Finally, the announcement that several synthetic plants would be built softened the market even though these will not go on stream until early 1953.

A New Era Begins

All in all, the 1952 alcohol year will be a mixed one. And it may well usher in a new era in the solvents markets—an era marked by more confusion, competition and political jockeying.

Certainly the signs point to trouble ahead, especially for the fermenters. Capacity for synthetic will soon be up to 211 million gallons; yet the demand for industrial alcohol hovers at 200 million, not counting the nowminor needs of butadiene. Of this total, only 35-40 million gallons are specified to be made by fermentation. This indicates an excess capacity of close to 50 million. How soon will normal growth demands take it up?

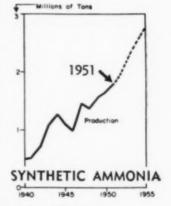
Part of the acetaldehyde market may also be lost. New plants to make acetic acid and acetaldehyde from hydrocarbons will cut into the use of alcohol. Acetaldehyde—with a take of almost 90 million gallons in 1950—is the top consumer of specially denatured alco-

Military demands for ethyl alcohol are large; but these are still on paper, aren't likely to get off of it short of an all-out war. If they should, then the military and civilian needs could

top even the projected alcohol capacity, quickly turn too much into too

Demand for butadiene alcohol is largely governed by the political climate, both domestic and foreign. Right now, it's small. Fermentation plants can take care of the actual or potential demands from the synthetic rubber industry.

Finally, though, on alcohol's credit side is this factor: the surge of ethylene chemicals, particularly polyethylene, might well bolster the ethylene demand to the point that synthetic alcohol producers (who are really ethylene producers) can divert some of their ethylene into more profitable chemicals, less into alcohol.



Adds a Third More

Supplies of nitrogen chemicals, chiefly ammonia, continue to grow at a fast clip.

Synthetic ammonia capacity now installed can supply close to 1.8 million tons of nitrogen per year. Projects covered by certificates of necessity for 16 new or expanded plants will add another one-third to this figure by the end of next year.

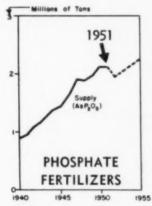
Although the projected plants will supply little for this spring's fertilizer season, some will come through later in the year. Most of the new units, however, will come in during 1953, many of them late in the year.

Our total nitrogen supply includes, besides ammonia: 220,000 tons of byproduct nitrogen; 40,000 tons of organic nitrogen for fertilizer; net imports of 200,000 tons. Thus the total nitrogen available by the end of next year will approach 3 million tons.

Agriculture consumes two-third of our nitrogen supply and will continue to dominate the scene. Industrial requirements have been 400,000 to 450,000 tons, military requirements about 100,000 tons, and exports another 100,000 tons per year.

Official Washington doesn't expect any large increase in non-agriculture demands for nitrogen. But military needs might suddenly skyrocket in the event of a major war. Demands for industry, also climbing, will hit close to 600,000 tons by 1955.

Price of synthetic ammonia advanced during 1951 from \$74 to \$79 per ton. Prices of nitrogen fertilizers have increased slightly, but less than almost any other commodity or service that the farmer buys. The combined efforts of industry and government are likely to keep supplies fairly close to demand.



Make New Shifts

The fertilizer industry got almost 2 million tons of P₂O₈ during the year ending last June 31. It will get about the same for the present fertilizer year. This is about 8 percent under the peak tonnage chalked up during 1950.

Phosphate production for the first six months of 1951 (calender year) exceeded that of the same period of 1950 by several percent, but the lack of sulphuric acid throttled output during the second half of the year. Total tonnage last year, therefore, was almost identical with that of 1950. Production in 1952 will be less by 5 to 10 percent; the exact figure depends altogether on how much sulphuric acid is available.

This shortage of acid gives rise to many shifts in the industry. Phosphate producers are already using sulphuric very carefully in order to get the maximum available phosphate from each precious ton of acid. Bonus: an increase in the ratio of phosphate

to acid by 3 or 4 percent-a trend that'll go even further.

Another way to increase the phosphate supply is to commercialize the mixed-acid treatment of rock. Here the producer uses a mixture of nitric and sulphuric acids to stretch the supply of scarce sulphuric. Interest is keen, and several producers are delving into the economics of nitric-sulphuric acidulation.

One significant recent trend is the rapid rise in the output of concentrated superphosphate; another gain is expected in 1952. The supply in concentrated forms now approaches 20 percent of the national total.

Then, too, AEC's program of recovering uranium from wet phosphoric acid gives the trend toward concentrated superphosphate a shot in the arm. Several pilot plants of commercials size are being set up and experimentally operated; look for bigger moves in 1953.

Need for superphosphate to make mixed fertilizers has topped the supply almost continuously for the past ten years. The demand in 1952 will exceed the supply by at least 10 percent-perhaps 15 percent in some areas. Besides, keen interest in grassland agriculture is now building up a hefty new demand.

Prices of superphosphate, which haven't changed much during recent years, will continue at present levels.

ISOPROPYL ALCOHOL Frets About Acetone

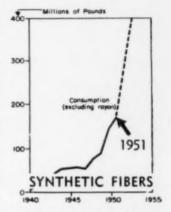
Producers operated at full capacity during 1951. And they had no trouble in getting rid of their entire output of over 110 million gallons. Practically no new production came in during the year.

Demand eased up in the last quarter-a result of the slow-down in acetone. However, large export orders for isopropyl and acetone helped to take surplus off the market. And the high price of ethyl alcohol helped isopropyl to hold on to users who swung to it when ethyl went up.

Isopropyl alcohol affects—and is affected by—developments in the ethyl and methyl alcohol businesses. But now isopropyl producers have another headache: what's going to happen to their acetone market?

A large part of the present isopropyl output ends up as acetone; the lion's share of this, in turn, goes to the synthetic fiber industry, which didn't fare very well in 1951. Right now the industry hopes the market will be better this year, believes it will at least match last year's.

New demands for propylene in the petroleum field will help preserve isopropyl's market and stabilize the industry.



Make Headlines Again

Big news last year in the synthetic fiber industry was the grand rush to put acrylic fibers into commercial operation. Result: another record year for our man-made fibers.

But don't think that this growth is slacking off. It hasn't and won't soon.

In the next few years output of acrylic staple fibers will push the 80 million pound-per-year mark. This doesn't include the unannounced but "in the works" plans for fiber output that American Cyanamid, Celanese, Industrial Rayon and Tennessee Eastman all have. Nor does it take into account any other plant that DuPont might build in the next few years.

By 1955 acrylic fibers should be in the "over 100-million pound per year" class along with nylon.

Recent estimates on our total nonrayon synthetic fiber demand in coming years show that 1953's tally should hit 400 million pounds. By 1958 the figure is expected to be 500 million —and 750 million by 1960. And remember that these don't include rayon and acetate fibers.

But acrylics were not the only fibers that set new records in the face of a sagging textile market last fall. Du-Pont's polyester, Dacron, arrived in retail stores. Like acrylics, it is finding a spot in the wool-blend and all-synthetic markets.

And Vicara, Virginia - Carolina's new synthetic protein fiber, is in healthy demand for blending with wool or other synthetics. Vicara capacity has been steadily increasing since 1950; this year's supply should

be very close to 12 million pounds. England's Ardil, another proteinbase synthetic, went into commercial production. Output last year was close to 8 million pounds; plant capacity is closer to 22 million.

Vicara and Ardil underscore another new trend in the textile industry: an era of utility blends of natural and synthetic fibers. Both stand to gain.

Textile Slump Hits Rayon

Total rayon shipments, which just about broke even with those of 1950, came to a little more than 1.2 billion pounds.

Textile use of viscose yarn, however, sagged about 12 percent; acetate textile markets slumped more than 15 percent. At year's end, rayon stocks were close to 100 million pounds—a gain of 548 percent over the 1950 level. This reflected the sagging textile market, now on the upgrade again.

The growth of the tire industry last year was a big factor in keeping rayon up in spite of the textile slump.

Rayon capacities are still growing. By last November the total was 1.4 billion pounds a year; by July of this year it's slated to be 1.5 billion. And by the latter part of 1953 the country's rayon capacity will hit 1.7 billion pounds a year—maybe a little more.

HIGHER SOLVENTS Expect a 5 Percent

Early 1951 strong demands for durable goods were reflected in normal butyl alcohol and acetate. But the market for these solvents eased up as cut-backs were made in automobiles and as the demand for refrigerators, television sets and other products using protective coatings tapered off. Voluntary price cuts were made late in the year.

The 1951 production of normal butyl alcohol was 25 million gallons almost 16 percent above the previous year's figure.

But secondary butyl alcohol and acctate—as well as the corresponding isobutyls—fared better than the normal butyls. During most of the year, sales of the secondary compounds were limited by the acetic acid available. This was a repeat of the 1950 story.

One company-Standard of N. J.

-has plans to put up an iso-octyl plant at Baton Rouge.

Antibiotic producers continue to take the lion's share of synthetic amyl alcohol.

All in all, the alcohol and solvents

industry can look forward to a 1952 business that'll be within 5 percent —plus or minus—of the demand. Beyond that, there'll probably be a period of confusion and softening prices that may last for several years.

In the intermediate and higher boiling fields, any increase in demands must come from normal growth; uses appear to have off. may even decline a bit.

KETONES Go Up and Down

Acetone, firm during the first half of 1951, later softened; at year's end the market was spotty. Chief reason: the slump in the textile industry, a big user of this ketone.

Textiles are picking up again. But some acetone producers are still wondering if the pick-up will be big enough and last long enough to raise demand to the level of the year's

Producers also face a threat from byproduct acetone that'll be turned out by the cumene hydroperoxide process for making phenol. Some 48 million pounds of byproduct acetone will come from new phenol plants already projected. Although this is a small percentage of the total output, it will have to be moved.

And if the cumene process becomes widely used, its acetone may have to move at distress prices. If that time comes, isopropyl alcohol plants will probably convert less of their product into acetone, put more of it on the market as the alcohol. That's what causes the fretting among acetone producers right now.

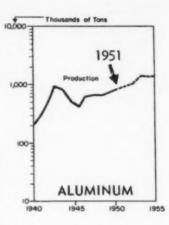
Last year's output of methyl ethyl ketone came close to 20 million gallons—a hike of 10 percent over 1950 that came from the increased facilities of one large producer. This year's output will likely be even higher.

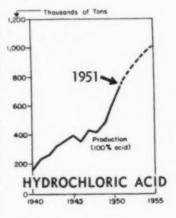
Demand for ketone during the first half of the year was above production. But the dip in the output of automobiles—where a large percentage of MEK is used in coatings—later eased the demand.

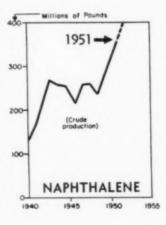
Unless military needs go up appreciably, MEK should have no trouble in striking a balance between supply and demand for the next few years.

Methyl isobutyl ketone followed MEK's pattern: strong, then weaker, in balance by year's end.

This balance was struck by a weakening in the needs of methyl isobutyl ketone both as a nitrocellulose solvent and in vinyl resins. In addition, a larger volume of competing materials began to hit the market.







New Plants and Facilities Underway in 1951

Below is a partial listing of U. S. plants and facilities—in or related to the chemical process industries—either planned, under construction, or completed during 1951.

American Cyanamid (Govt. contract) Blockson Chemical Joilet, Ill Uranium Under onsatruction. First plant to iform vet-process phosphoric acid. Certificate of necessity granted. Dow and Detroit Edition (Govt. contract) Dow and Detroit Edition (Govt. contract) Do Post. Alken, S. C. 1.250,000,000 Govt. contract) Chemat Uranium and electric power. Under way. Under construction. Tritium to lithium in atomic reaction. Contract of the contract	ARES
(Govt. contract) Electron Characteric Climax Uranium	
Blockson Chemical Govt. contract) Govt. co	used reactor fuel
Climax Uranium oxide. Convand Detroit Edison. (Govt. centract) Convand Detroit Edison. C	recover uranium
(Govt. centract) Du Pent. Alken, S. C. 1.280,000,000 Govt. centract) Ceneral Electric Richland, Wash 208,000,000 Huternational Minerals & Chemical Govt. centract) Bartow, Fla Uranium Recovery facilities will be incorp process phosphorie acid plant. Monanto and Union Electric Plutonium and electric power. Under way, Refinery under construction. Govt. contract) Monanto and Union Electric Plutonium and electric power. Uranium Recovery facilities will be incorp process. Under way, Refinery under construction. Govt. contract) Procter & Gamble Govt. contract) Clorit. contract) Clorit. contract) Under way. Refinery under construction. Govt. contract) Under way. Resovery facilities will be incorp process phosphorie acid plant. Under way. Refinery under construction. Govt. contract) Under way. Resovery facilities of Under way. Under way. Resovery facilities of Under construction. Govt. contract) Uranium 235. Under construction. Gaseous diffur from the construction of Converted kalunite plant. Caustric SODA, Chiorine, SodA ash Allied Chemical & Dev. Baton Rouge La. 18,000,000 Soda ash. Contract awarded for additions.	
(Govt. contract) Ceneral Electrie Richland, Wash 208,000,000 Plutonium International Minerale & Chemical Govt. contract International Minerale & Chemical Govt. contract) Monanto and Union Electric Plutonium and electric power. National Lead Cincinnati, Obio 30,000,000 Govt. contract) Procter & Gamble Amarillo, Tex. 22,000,000 Clover, Contract Contract) Union Carbido. Covt. contract) Unanium 235. Under construction. Carbido. Covt. contract) Unanium 235. Under construction. Carbido. Covt. contract) Unanium 236. Under construction. Casevery facilities will be incorpe processe phosphorie acid plant. Unanium 236. Under construction. Casevery facilities will be incorpe processe phosphorie acid plant. Caustric Soda, Chlorine, Soda Ash Allied Chemical & Dye Baton Rouge La. 15,000,000 Soda ash Contract awarded for additions.	be made from
cal Bartow, Fla Uranium Becovery facilities will be incorp (Govt. contract) Monanto and Union Electric. National Lead Cincinnati, Obio 30,000,000 (Govt. contract) Procter & Gamble Amarillo, Tex. 22,000,000 (Govt. contract) Unanium Reactivating Army Ordanes Part (Govt. contract) Unanium 235. Operation started. Fourth gaseous (Govt. contract) Unanium 235. Uranium 236. Uranium carbide. Govt. contract) Unanium 236. Uranium 23	
Monanto and Union Electric Plutonium and electric prover. Under way. National Lead Cincinnati, Obio 30,000,000 Uranium Under way. Refinery under construction. Govt. contract) Procter & Gamble Amarillo, Tex. 22,000,000 (Govt. contract) Unanium Reactivating Army Ordeanee Pai operate mid-1952. Union Carbido Operation started. Fourth gaseous (Govt. contract) Unanium 235. Operation started. Fourth gaseous (Govt. contract) Unanium 236. Under construction. Gaseous diffur (Govt. contract) Uranium 236. Under construction. Gaseous diffur (Govt. contract) Virginia-Carolina Recovery facilities will be incorpe process of the Chemical Sult Lake City, Utab 800,000 Uranium ore Converted kalunite plant. CAUSTIC SODA, CHLORINE, SODA ASH Allied Chemical & Dev. Baton Rouge La. 18,000,000 Soda ash Contract awarded for additions.	erated into wet
National Lead Cincinnati, Obio 30,000,000 Uranium Refinery under construction. (Govt. contract) Procter & Gamble Amarillo, Tex. 22,000,000 Reactivating Army Ordnance Pai (Govt. contract) Union Carbido. Oak Ridge. Team. 105,000,000 Uranium 235. Operate mid-1982. Union Carbido. Paducab, Ky. 500,000,000 Uranium 235. Under construction. Gaseous diffur (Govt. contract) Union Carbido. Uranium 235. Under construction. Gaseous diffur (Govt. contract) Virinnia-Carolina Recovery familities will be insorpe processe phosphories acid plant. Uranium ore Caustic Soda, Chlorine, Soda Ash Allied Chemical & Dev Baton Rouge, La. 18,000,000 Soda ash. Contract awarded for additions.	
Procter d'Gamble (Govt. contract) (Govt. contract) (Govt. contract) (Inion Carbide Garble	
Union Carbido. Oak Ridge, Team. 105,000,000 Uranium 235. Operation started. Fourth gaseous (Govt. constract) Union Carbido. Paduesh, Ky. 500,000,000 Uranium 235. Under construction. Gaseous diffus (Govt. construct) Virginia-Carolina. Uranium. Recovery familisies will be insorpe processe phosphories acid plant. Vitro Chemical Sult Lake City, Utah. 500,000 Uranium ore. Cauverted kalunite plant. CAUSTIC SODA, CHLORINE, SODA ASH Allied Chemical & Dre Baton Rouge, La. 15,000,000 Soda ash. Contract awarded for additions.	nter plant. To
Cuion Carbido. (Govt. contract) Virginiar-Carcilina (Gevt. contract) Virginiar-Carcilina Caverted kalunite plant. Caverted kalunite plant. Causerted kalunite plant. Causerted kalunite plant. Causerted kalunite plant. Contract awarded for additions.	diffusion plant
Virginia-Carolina (Gavt. contract) Virto Chemical Selt Lake City, Utab 800,000 Uranium ore Converted kalunite plant. CAUSTIC SODA, CHLORINE, SODA ASH Allied Chemical & Dve Baton Rouge, La. 15,000,000 Soda ash Contract awarded for additions.	sion plant
Vitro Chemical Salt Lake City, Utab 800,000 Uranium ore Converted kalunite plant. CAUSTIC SODA, CHLORINE, SODA ASH Allied Chemical & Dve Baton Rouge, La. 15,000,000 Soda ash Contract awarded for additions.	erated into wet-
Allied Chemical & Dye Baton Rouge, La. 18,000,000 Soda ash Contract awarded for additions.	
Allied Chemical & Dve Baton Rouge, La. 18,000,000 Soda ash Contract awarded for additions.	
Affied Chamical & Days Syragusa N. V. 10,000,000 Caustic and chloring Under construction. Will double on	
(Solvay) Mercury cells.	apacity
Allied Chemical & Dye Hopewell, Va. 2,180,000 Chlorine Under construction. From nitrosyl (Solvay) 50% bloot in capacity (28 tons per	day)
Affied Chemical & Dye	
Arvey Corp. Memphia, Tenn. 1,700,000 Caustic and chlorine Will double capacity. Brown Co. Berlin, N. H 221,000 Caustic and chlorine Certificate of necessity granted. 14	
Brown Co. Berlin, N. H. 221,000 Caustic and chlorine. Certificate of necessity granted. 14 Champion Paper & Fibre Pasadena, Tez. Caustic and chlorine. Finishing installation of 20 addition For bleaching.	al cells.
Pitteburgh Plate Glass Natrium, W. Va	14 tons per day
Diamond Alkali. Houston, Tex 5,500,000 Caustic and chlorine. Expansion program underway. Diamond Alkali. Painesville, Ohio. Caustic and chlorine. Will more than double capacity. Li to be dropped.	ime-eeds method
Dow. Midland, Mich. 9,405,000 Caustie and chlorine. Certificate of necessity granted. Dow. Pittsburg, Calif. 2,039,000 Caustie, chlorine, ashy-	
droug ammonia Certificate of peconsity granted for	additions
Dow. Freeport, Tex. 3.750,000 Caustie and chlorine. Under construction. Food Machinery & Chemical Westvaco, Wyo. 20.000,000 Refined natural sods ash Under construction. Westvaco, Wood Caustie and chlorine. Under construction.	per year.
Frontier Chemicals of Kanses. Wichita, Kan. 1,468,000 Caustic and chlorins Under construction. 43 tens per da For nearby banker plant.	ay of chlorine
Kaiser Aluminum & Chemical Freeport, Tex Soda ash Certificate of necessity granted. Caluminum.	Captive plant for
Hercules Brunawick, Ga. Chlorine Planned From RCL First com	mercial unit.
Hooker Electrochemical Tacoma, Wash. 3.000,000 Caustie and chlorine Certificate of necessity granted. Hooker Electrochemical Montague, Mich. 10.000,1000 Caustie and chlorine Being engineered. 100,000 tens	per year of all
Hooker Electrochemical Niagara Falls, N. Y 5348,000 Caustic and chlorine Certificate of necessity granted. 25	tons per day of
Innis Speiden Niagara Falls, N. Y SHIL-1899 Caustic and chlorine Certificate of necessity granted.	
Mathieson Alabama Chemical McIntosh, Ala	
Mathicson Chemical Saltville, Va. 682,789 Caustic and chlorine Certificate of necessity granted. El Mathicson Chemical West Point, Va. 9,150,000 Caustic and chlorine Certificate of necessity granted.	apansion.
Michigan Chemical. St. Louis, Mich. 10,699,000 Caustie and chlorine. Certificate of necessity granted.	34 tone per das
Monsanto	k
Monanto St. Louis, Ill 1,450,000 Caustic and chlorine Certificate of necessity granted. St. Louis, Ill chlorine	28 tons per day
National Distillers Ashtabula, Ohio Chlorine, sodium, sodium peroxide Will enlarge chlorine and sodium pl	ant by 60%.
Niagara Alkali	22 tons per day
N. Carolina Pulp & Paper Roanoke Rapids, N. C 1.500,000 Caustic and chlorine Certificate of necessity granted.	11 tone per day
Pennsalt	
Pennsalt. Tacoma, Wash 445.000 Caustic and chlorine. Will increase capacity by 30%. Pennsalt. Calvert City, Ky 8.000.000 Caustic and chlorine Operate early 1953. Moreury cells.	
Pennsalt. Portland, Ore. 1.500,000 Caustic and chlorine. Under construction. 48% increase (Caustic Soda, Chlorine,	

THE BATTLE FOR	LOCATION	DOLLARS	PRODUCT(8)	JOB STATUS AND REMARKS
Caustle Soda, Chlorine, Se		DOLLMES	THODOCT (III)	TOU STATUS AND BEHARMS
Southern Alkali		8,700,000	Caustic and chlorine	
Southern Alkali			Caustie and chlorine	chlorine. On stream. 163 tons per day chlorine.
Southern Alkali	Natrium, W. Va	2,000,000	Caustic and chlorine	Under construction.
Stauffer	Niagara Falls, N. Y	********	Caustic and chlorine	Under construction. Additional expansion to 100 tons per day chlorine.
Tennesse Producte & Chemical	Chattanooga, Tonn	3,230,000	Caustic and ehlorine	Certificate of necessity granted. 50 tons per day chlorine.
Wyandotte	Wyandotte, Mich	23,300,000	Caustie and chlorine	Certificate of necessity granted. 230 tons per day chlorine.
COKE AND COAL	CHEMICALS			
Allied Chemical & Dyc	Ashland, Ky	11,575,500	Coke oven	Certificate of noncesity granted.
(Semet-Solvay) Allied Chemical & Dyo	Hegewisch, Ind	15,000,000	Coal tar	Planned.
(Barrett) Allied Chemical & Dye	Ironton, Ohio	*********	Naphthalene and	Certificate of necessity granted.
Colorado Fuel & Iron	Pueblo, Colo		quinoline Coke and hyproduct	Raised capacity from 2,788 to 3,000 tons per day of
Donner-Hanna Coke	Buffalo, N. Y	250,000	chemicals Bensene	coke. Raising espacity from 3.6 to 3.9 million gal. perday.
Ford Motor	Detroit, Mich		Coke and byproducts	Plan 37 extra coke ovens. Metallurgical coke for iron production at Cleveland.
Geneva Steel	Provo, Utah	**********	Coke oven	Will build battery of 23 ovens. Building 27 shemical recovery coke ovens.
Great Lakes Carbon	St. Louis, Mo		Coke oven	Building 40 additional ovens.
Pittsburgh Coke & Chemical	Warren Township, Ohio Neville Island, Pa	6.115.000	Pitch coke	Certificate of necessity granted. Certificate of necessity granted.
Sheffold Steel	Houston, Tes	1,976,200	Coke oven	Building 15 additional ovens. Certificate of necessity granted.
U. S. Steel	Clairton, Pa	1,976,200	Coke and byproducts	Contract awarded for 3 new batteries.
U. S. Steel	Morriaville, Pa	11.000,000	Coke and byproducts Gasoline, aromatics,	Contract awarded for 2 batteries—87 ovens each. Coal hydrogenation plant being built. 300 tons per
			cartions	day coal.
Woodward Iron		4,000,000	Coke oven	Building 30 ovens.
DETERGENTS				
Atlantic Refining	Port Arthur, Tex	2,000,000	Synthetic detergents	Will produce. Will produce.
Atlantic Refining . Colgate-Palmolive-Peet	Philadelphia, Pa Kanses City, Kan	1,000,000	Seap	Raising capacity.
General Aniline & Film Lever Bros	Doe Run, Ky Pagedale, Mo	5,000,000	Synthetic detergents	Will produce. Under construction.
Lever Bros Nopeo Chemical	Los Angeles, Calif	25,000,000	Detergents, food products	Put into operation.
Procter & Camble	Richmond, Calif	1,000,000	Palmitates, stearates, etc. Detergent	Fut into operation. Under construction.
Proctor & Gamble	Sacramento, Calif	10,000,000	Scap and special detergents	Plannel.
Stepan Chemical	Chicago, Ill	********	Alkyl aryl sulphonates, etc.	Under construction. New sulphenation unit twice the size of old plant.
FERTILIZERS, AMM	ONIA, PHOSPHORUS			
Activated Fertilizer	Spokane, Wash	100,000	Superphosphate	Construction begun.
Allied Chemical & Dye (Bolvay)	Hopewell, Va	25,000,000	Synthetic ammonia	Will boost capacity by 120,000 tons per year. Convert to natural gas for hydrogen.
Armour Fertilizer	Bartow, Fla	800,000	Fertilisers	Capacity doubled.
Atlantic Refining	Philadelphia, Fa	3,400,000	Ammonia	Hydrogen from dehydrogenation reactions. Certifi- cate of necessity granted.
Commercial Solvents	Sterlington, La	20,000,000	Ammonia, methanol ammonium nitrate	Will double capacity.
Consumers Coop. Am'n	Lawrence, Kan	16,000.000	Nitrogen products	Will build. For fertilizers. Use natural gas. Planned. 200 toos per day.
Dow	Freeport, Tez	3,500,000 5,000,000	Triple superphosphate	Certificate of necessity gran ed.
Food Machinery & Chemical (Westvaco)	8. Charlestom, W. Va,	2,503,000	Ammonia	Being engineered. Use cell hydrogen.
Food Machinery & Chemical. (Westvaco)	Pocatello, Idaho	4,500,000	Elemental phosphorus	Contract awarded. Fourth furnace.
Food Machinery & Chemical. (Westvaco)	Newark, Calif		Phosphates	Underway. Complete July 1982.
Food Machinery & Chemical (Westvaco)	Cartaret, N. J.		Phosphates	Underway. Complete July 1952.
Food Machinery & Chemical (Westvaco)	Lawrence, Kan		Phosphates	Underway. Complete July 1952.
General Fetroleum	Torrance, Calif	250,000	Ammonium sulphate	In production. From sludge, waste H:8Os, and nitrogenous component of byproduct gas.
Hooker Electrochemical.	Tacoma, Wash	2,000,000	Anhydrous ammonia	In production. First in Pacific Northwest.
Interlake Iron International Minerals & Chemical	Chicago, Ill Fort Worth, Tex	400,000	Ammonium sulphate Superphosphate and mixed fertiliser	Planned. Use waste ammonia and buy acid. In production. 40,000 tons per year.
International Minerals & Chemical	Mulberry, Fla	10,000,000	Multiple superphosphate,	Under construction. Uranium byproduct.
International Minerals &	Carlabad, N. M	2,000,000	Potash	To be erected.
Chemical International Minerals & Chemical	Maury County, Tenn		Phosphates	Acquired 2,500 acres of phosphate mining property
Lion Oil		30,452,000	Anhydrous ammonia	Certificate of necessity granted. Seratching for
Mathieson	Morgantown, W. Va	*********	Ammonia	natural gas. Second largest plant of its kind in country. Reactivate by March, 1952.
Mathieson.	Lake Charles, La		Ammonia	Increasing capacity. Ha will be piped from Southern Alkali next door.
Missimippi Chemical	Yasoo City, Mins	8,000,000	Anhydrous ammonia	In production. Claude process.
Monsanto	Monsento, Tenn. Soda Springe, Idaho	******	Phosphorus	Certificate of necessity granted. Sixth furnace. Under construction.
Montanto	Ilt. Louis, Mo	1,000,000	Sodium phosphates	Construction started on new plant.
Pennsalt	Wyandotte, Mich	2,450,000	Anhydrous ammonia	Certificate of necessity granted.

				FLANTS & FACILITIES
FIRM Fortilizers, Ammonia, Phosp	LOCATION	DOLLARS	PRODUCT(#)	JOB STATUS AND REMARKS
Phillips Chemical	Houston Ship Channel, Tex.	30,000,000	Ammonia, methanol	Planned.
Phillips Chemical	Houston, Tex		Continuous triple super- phosphate	Planned. Might use CaSO ₄ byproduct for ammonium sulfate.
Potash Co. of America		783,000	Hydrochloric acid, potassium sulphate	Under construction.
Shea Chemical	Goodwin, Tenn	3,000,000	Dicalcium phosphate	To be erected, Under construction. From natural gas.
Slow-Shoffield Steel & Iron	Birmingham, Ala	150,000	Ammonium sulphate	Certificate of necessity granted.
Southwest Potash	Carlsbad, N.M	10,000,000	Potash	Under construction. 185,000 tons per year initial capacity.
Spencer Chemical	Pittaburg, Kan		Anhydrous ammonia.	In production. Brings Spencer ammonia capacity to
Spencer Chemical	Pittsburg, Kan		nitric acid Ammonium nitrate	255,000 tons per year. In production. Two prilling towers, each 1,000 ton
Spencer Chemical	Viekaburg, Min		Anhydrous ammonia	per day. Under construction.
Swift	Bartow, Fla		Fertiliser	In production. Capacity raised to 20,000 tons per year.
Texas City Chemicals	Texas City, Tex	4,500,000	Superphosphate	Certificate of pecessity granted.
U. S. Govt(TVA)	*******************	*******	Metaphosphate	Planned. Cutback in concentrated superphosphate
Victor Chemical	South Gate, Calif		Phosphoric acid, sodium phosphate	Will expand.
Victor Chemical	Silver Bow, Mont	5,000,008	Phosphorus	Second furnace under construction.
Virginia-Carolina	Charleston, S. C Tennessee	700,000	Phospharus Phosphate rock	Certificate of necessity granted. Planned. Phosphate mining facilities.
Virginia-Carolina	Florida	*********	Phosphate rook	Planned. Phosphate mining facilities.
Woodward Iroa	Woodward, Ala	6,000,000	Anhydrous ammonia	Certificate of necessity granted.
METALS & ALLOYS				
Alabama-Cooss Tis		35,000,000	Tin	Planned. 25 tons per day. Under construction. 170 million lb. per year.
Aluminum Co. of America	Rockdale, Tex	115,000,000	Aluminum	Under construction. 170 million ib. per year. Reactivated. Unseconomical for normal operation
				86.7 million lb. per year.
Aluminum Co. of America	Massena, N. Y		Aluminum	Reactivated. Uneconomical for normal operation 144 million lb. per year.
Aluminum Co. of America	Point Comfort, Tex	80,000,000	Alumínum	Under construction. Raising capacity by 70 million
luminum Co. of America	Wenatchee, Wash	********	Aluminum	Under construction. 176 million lb per year.
merican Smelting & Refining	Landville, Colo		Lead	Certificate of necessity granted.
naconda	Kalispell, Mont	46,000,000 723,500	Aluminum	Planned. 108 million lb. per year. Certificate of necessity granted.
bromium Mining & Smelting	Glendive, Mont	1.500,000	Ferrochrome	Planned. 2 million lb. per month. To be built. Ferrochrome—principal product.
Chromium Mining & Smelting	Woodstock, Tenn	********	Ferro-manganese	Begin construction early 1952.
rane	Chicago, Ill.	162,500	Titanium	Under construction. Pilot plant. I ten per week.
(Govt. contract)	Paineaville, Ohio		Magnesium	Reactivated.
Dow	Velasco, Tex		Magnesium	Rehabilitated. 80 million lb. per year. From sea- water.
(Govt. contract)	Midland, Mich	3,138,000	Magnesium	Certificate of necessity granted.
Dow Corning	Bay City, Mich	225,700 560,000	Magnesium alley Silicon	Certificate of necessity granted. Certificate of necessity granted. For silicones.
Du Pont	Newport, Del	1,227,000	Titanium	Will build. 10 tons per day.
Roel Smelting	Knoaville, Tenn		Manganese	Planned. Increase to 300 tons per month. Expanding. From scrap.
oote Mineral	Memphis, Tenn Exton, Pa	215,000	Lithium	Expansion completed. Will double c pacity. New
General Electric			Chromium carbide—	Under construction. 85% chromium carbide.
			nickel alloy	
lowe Sound	Garfield, Utah	1,400,000	CobaltAluminum	Under construction. Chemico process. Expansion completed. Upped to 80 million lb. per year.
Caiser Aluminum & Chemical.	Mead, Wash		Aluminum	Under construction. Capacity will be increased by
Caiser Aluminum & Chemical.	Chalmette, La		Aluminum	40 million lb. per year. Under construction. Capacity 200 million lb. per
(aiser Aluminum & Chemical	Permanente, Calif		Ferrosilicon	year. Planned: 200 million more. Under construction. Expansion.
(Govt. contract)	Manteca, Calif		Magnesium	Reactivated. 10,000 tons per year.
cokuk Electro-Metals	Rock Island, Wash	240,000	Ferrosilicon	Certificate of necessity granted.
Cookuk Electro-Metals	Kenkuk, Iowa Henderson, Nev	2,000,000	Ferrosilieon	Certificate of necessity granted. Under construction.
Intthiemen & Negler Zinc	La Salle, Ill	200,000	CadmiumTitanium	Certificate of necessity granted. In production, Re-modeled Basic Magnesium plant.
(Titanium Metals)				10 tons per day.
low Jersey Zine	Fredericktown, Mo		CobaltZine	Under construction. 50 tons per day concentrates. Certificate of necessity granted.
acific Northwest Alloys	Mund, Wash		Magnonium	Reactivated.
(Govt. contract)	Philadelphia, Pa	240,000	Pig lead	Certificate of necessity granted.
Refining tem—Cru Titanium	Pitteburgh, Pa	126,000	Titanium	Certificate of necessity granted.
synolds Metals	Corpus Christi, Tex	90,000,000	Aluminum	Under construction. 150 million lb. per year. Planned. 110 million lb. per year.
Synoids Metals	Arkansas	*********	Aluminum	Planned. 40 million b. per year.
enn-Tex Alloy & Chemical	Houston Ship Channel, Tex	********	Ferro-alloys	Planned. 5,000 tons imported manganese ore per month.
7. S. Govt	Albany, Ore	350,000	Zirecalum	Fourth unit underway.
(Floring Metalluscies)	Marietta, Ohio	78,538,000	Ferre-alloys and caleium carbide	In production.
nion Carbida	Kokomo, Ind		Alloys	Certificate of necessity granted.
	auntahula (Mio		Ferrosilicoa	Certificate of necessity granted.
nion Carbide	Ashtabula, Ohio	7,000,000	Silicon alloys	Under construction.

1 11 6	OAI	ILE	FUR	PRC	DUC
	FII		LOC		

FIRM	LUCATION

OLLARS	PRODUCT(S)

JOB STATUS AND REMARKS

PESTICIDES

Allied Chemical & Dye. Arvey Corp. Benarol Products. Commercial Solvents Commercial Solvents Du Pont Heroulies. Heroulies. Heroulies. Heroulies. Heroulies. Pennant Pennant Pennant Pennant Pennant Pittaburgh Coke & Chemical Southern Alkali Southern Alkali Tennamee Frontier Chemical U. S. Industrial Chemicals	Marcus Hook, Ps. Memphis, Tenn. Newark, N. J. Terre Haute, Ind La Porte, Tex. Hattiesburg, Miss Henderson, Nev Newark, N. J. Houston, Tex. House, J. Houston, Tex. Nisaras Falls, N. Y. Nisaras Falls, N. Y. Portland, Ore, Montgonery, Ala. Neville Island, Pa Wyandotte, Mieb Natrium, W. Va Henderson, Nev Wieblta, Kan Baltimore, M. Kana Baltimore, M. Kan Baltimore, M. Kan Institute, W. Va	\$00.000 1.730.000 2.500.000 530.000 100.000	Insecticides Heptachlor Allethrin Lindase Benssen bexachloride Fungicides Toxaphane Toxaphane Toxaphene Benssen beszehloride DDT Insecticides DDT Insecticides Phosphate insecticides Endothal Benssen bexachloride	Certificate of necessity granted. Adding unit. Redouble expacity. Underway. Under construction. Certificate of necessity granted. Certificate of necessity granted. In operation. Under construction. Certificate of necessity granted. In operation. Certificate of necessity granted. Expanding capacity. Now in production. Certificate of necessity granted. Expanding capacity. Now in production. Certificate of necessity granted. Certificate of necessity granted. Construction underway. Will double capacity. In production underway. Will double capacity. Under construction. 36 x500 lb, per year. Second plant opened. 2.5 million lb. per month. Under construction.
(Carbide & Carbot.)	Teas		Incentiaide	Planned

PETROLEUM & NATURAL GAS

Aetna Oil Allied Chemical & Dye	Louisville, Ky	6,000,000	Refined petroleum Natural gas cracking	Planned. Certificate of necessity granted.
(Solvay) Allied Chemical & Dye	Point, Ohio Hopewell, Va	6,000,000	Natural gas cracking	Certificate of necessity granted.
(Solvay)				
American Cyanamid Bay Chemical	Michigan City, Ind	5,100,000 1,000,000	Cracking catalysts Microspherical pstroloum cracking catalyst	In production. Underway,
01.01				Whenevel 60 cellifor the non-more
Carroll B. Fulton & H. W. Olmstead	St. Mary's Parish, La San Antonio, Tex	4,000,000 11,925,000		Planned. 80 million lb. per year. Planned.
	Salt Lake City, Utah	1,000,000	Refined petroleum	Proposed.
Carter Oil				
Cities Service	Chicago, Ill	1200000000	Grease	Underway. 8.5 million lb. per year.
Columbia Carbon	El Dorado, Ark	1,800,000	Carbon black	Under construction. Furnace type. 36 million in per year.
Continental Oil	Lake Charles, La	7,500,000	Refined petroleum	Contract awarded.
Continental Oil	Baton Rouge, La	23,000,000	Refined petroleum	Planned. Triple capacity.
Continental Oil	Houston, Tex	10,000,000	Refined petroleum	Planned.
Davison	Cipeinnati, Ohio		Miscrospheroidal fluid	In production. Spray-drying process.
			eracking catalysts	
Davison	Lake Charles, La	7,000,000	Cracking catalyst	Under construction.
Dolta Refining	Memphis, Tenn	1,900,000		Will expand.
	Painesville, Ohio	1,250,000	Paraffia	Certificate of necessity granted.
Diamond Alkali				
Eastern States Petroleum	Houston, Tex	3,300,000	Gasoline	Proposed.
Filtrol	Salt Lake City, Utah	3,000,000	Catalysts for petroleum	In production. Acidification of montmortlemite-
			refining	type clays.
General Petroleum	Torrance, Calif	400,000		Unit added. Catalytic polymerisation of propylene
			gasoline	(hyproduct gases).
Gedfrey L. Cabot	St. Mary's Parish, La	4,000,000	Carbon black	Site acquired. From oil and gas. 80 million lb- per year.
Gulf Oil	Port Arthur, Tex	8,000,000	Refined petroleum	In production. 60,000 bbl. per day. World's
				largest single fluid catalytic cracking unit.
Gulf Oil	Philadelphia, Pa		Refined petroleum	Planned. 75% expansion-76,000 bbl. per day.
J. M. Huber		3,000,000		First of 2 units in production. 72 million lb per
de ble fruiter	Baytown, Tex	3,000,000	Carbon Disce	
				year (both units).
J. M. Huber	Houston, Tex	1,000,000	Carbon black	Under construction. Double capacity.
Kanotez Refining	Arkansas City, Kan	2,300,000	Refined petroleum	Proposed.
Koppers	Rochester, N. Y		Reformed gases	Under construction. Regenerative furnace
Manage Har Distriction		2 000 000		Proposed.
Magnolia Petroleum	Longville, La	2,000,000	Casinghead gasoline	
Mereury Oil Refining	Oklahoma City, Okla	3,195,000	Gasoline, oils, avgas	Certificate of mocessity granted.
			components	
Missouri Farmers Ass'n	Memphis, Tenn	1,800,000	Refined petroleum	Contract awarded.
National Aluminate	Chicago, Ill.		Cracking catalysts	In full production.
Neches Butane Products	CHICAGO, MILLE LIVERS CO.			Under construction. Expanded facilities.
	Port Neches, Tex	1,000,000		
Oklahoma Natural Gas &	Major County, Okla		Gasoline	Planned. 80,000 gal. per day. From natural gas.
Warren Petroleum				
Onyx Refining	Abilene, Tex		Refined petroleum	Under construction. Thermal cracking unit
Pan American Refining	Texas City, Tex	2,000,000	Refined petroleum	Proposed. Espand Panares unit.
	Described I.			Under construction. 10,000 tons per month. For
Pan American Southern	Destrehan, La.		Petroleum coke	
				electrodes for aluminum production.
Fan American Southern	El Dorado, Ark	2,700,000	Refined petroleum	Completed. Fluid catalytic cracking vapor and re-
				covery unit.
Panhandle Eastern	Illinois		Ethane	Proposed. Natural gas stripping plant. Hypersorp-
	Emmonary and a service of the servic		220000000000000000000000000000000000000	tion or freezing out.
Patrol Baffalas	m 601 - m		t testes secultors	Plant purchased from government. Re-activated
Petrol Refining	Texas City, Tex		Aviation gasoline	
Phillips Chemical	Borger, Tex	3,800,000	Carbon black	Completing construction.
Phillips Petroleum	Okmulgee, Okla	600,000	High octane gasoline	Proposed. Expanded production.
Phillips Petroleum.,	Phillips, Tex	4,000,000	Propage and butage	Planned.
Phillips Petroleum.,.	Successive Trees		Aviation gasoline	Certificate of necessity granted.
Dilling Distriction	Sweeny, Tex	8,500,000		
Phillips Petroleum.	Salt Lake City, Utah	10,000,000	Refined petroleum	Under construction. Catalytic cracking plant. 5,000 bbl. per day.
Dramias Datedanni	Cast Wast Was	222 222	D-food vetraloum	Contract awarded. Refinery addition.
Premier Petroleum	Fort Worth, Tex	375,000	Refined petroleum	
Pure Oil	Beaumont-Port Arthur area.	********	Refined petroleum	Under construction. Enlarge refinery.
	Tex.			
Pure Oil	Toiedo. Ohio	7,400,000	Refined petroleum	Planned. Catalytic eracking unit.
Rochester Gas & Electric	Rochester, N. Y.	1,500,000	Fuel gas	Under construction. 1 million cu. ft. per day. Re-
Account of the second of the s	stormoster, at		E 440 CM	generative reforming of natural gas.
			- 11	generative reforming of matural gas.
Salt Lake Refining	-5464334413	********	Gasoline	In production. Largest Houdriflow unit to go on
				stream to date. 13,000 bbl. day.

FIRM	LOCATION	DOLLARS	PRODUCT(8)	JOB STATUS AND REMARKS
Petroleum and Natural Gas	(Cont.)			
Bhell Oil	Elk City, Okla		Crude oil, natural gaso- line, propane, butane,	In production. New processing and gas cycling plant.
Shell Oil	Houston, Tex	12,000,000		Contact awarded. Enlarging refinery. In full production. 60 million ou. ft. per day gas and 2,500 bbl. liquid per day.
Sinelair Refining Sid Richardson Carbon Sinelair	Pasadena, Tex. Fort Worth, Tex. Houston, Tex.	30,000,000 2,000,000 75,000,000	Carbon black	Underway. New facilities and modernisation. Certificate of necessity granted. Underway.
Skelly Oil Skelly Oil Skelly Oil	Velma, Okla Eunice, N. M Longview, Tex.	2,000,000 2,250,000 775,000		Proposed. Enlarge gas refining plant. Enlarging. Contract awarded. Additional unit for special re-
Socony-Vacuum.	Houston, Tex		Thermofor eracking	fining. New unit planned.
Sceony-Vacuum Standard Oil (Calif.)	Paulsbore, M. J. Richmond, Calif		eatalyst Bead catalyst Refined petroleum	Enlarged capacity. In production. Biggest vacuum flashing unit.
Standard Oil (Ind.)	Sugar Creek, Mo		Refined petroleum	55,000 bbl. per day. Under construction. Expand from 38,000 to 68,000
Standard Oil (Ind.). Standard Oil (N. J.). Standard Oil (Ohio).	Neodesha, Kan Everett, Mass	2.300,000 800,000 8,500,000	Refined petroleum Refined petroleum Gasolime	bbl. per day erude. Underway. Expand by 9,000 bbl. per day crude Contract awarded. Modernization and expansion. Underway. Crude stills.
Standard Oil (Tex.)	El Paso, Tex	9,000,000	Aviation gasoline	Underway. Crude stills. Proposed. Catalytic eracking unit. Under construction. 1,400 bbl. per day. Sulphuric acid allylation plant.
Standard Oil (Tex.)	El Paso, Tex	10,264,000	Heating oils and gaso- lines, diesel fuels Natural gasoline, butane,	Planned. 11,000 bbl. per day erude. Houdry catalytic eracking unit. Under construction. From natural gas.
Stanolind Oil & Gas	Ulyanea, Kan	2,750,000	propane Natural gasoline	Proposed.
Sun Oil	Marcus Hook, Pa	2,600,000	Aviation gasoline	Under construction. Propylene polymerization plant. Charging capacity: 6,000 bbl. per day.
Sun Oil	Marcus Hook, Pa Marcus Hook, Pa		Lubricating oil	Under construction. Combination crude and vacuum distallation unit for naphthenic type lubricants. Under construction. Refrigeration unit to boost
Nun Oil	Toledo, Ohio		Aviation gasoline .	Planned. Propylene polymerisation plant.
Sunray Oil	Corpus Christi, Tes	1,400,000	Refined petroleum	Planned. Catalytic eracking unit. 25,000 bbl. per day crude. Under construction. Medernise and enlarge
l'aylor Refining & Mayfair Minerale	Corpus Christi, Tex McAllen, Tex	2.575,000	Refined petroleum	Enlarging eyeling plant
Taylor Refining & Maylair Minerals	Port Isabel, Tex	475,000		Enlarging refinery.
Connessee Gas Transmission	Western Kentucky	12.000,000	Liquid hydrocarbone from natural gas	In limited production.
J. S. Govt Jaion Oil. Jaion Oil Jaion Oil Jaion Oil Jaited Carbon Juited Carbon	Otis, Kan. Edmonds, Wash. Los Angeles, Calif. Ventura, Calif. Shamroek, Tes. Franklin, La.	1,000,000 5,000,000 1,500,000 2,000,000	Helium from natural gas Asphalt Refined petroleum Refined petroleum Carbon black Carbon black	Re-opened. 45 million en. 1t. per year. In production. 65,000 tons per year. Underway. Fluid catalytic unit. Underway. Addition to estalytic cracking plant In production. 25 million lb. per year. In production. 30 million lb. per year.
Juited Carbon Warren Petroleum Witeo-Continental	St. Mary's Parish, La Fairview, Okla Lake Charles, La	2,300,000 1,600,000 2,000,000	Propage	Planning. Proposed. Propane producing gas plant In production. 25 million lb. per year
Witco-Continental	Sunray, Tex.		furnace black Semi-reinforcing furnace black	Expanded facilities.
Wood River Retining	Wiehita, Kan	7,000,000	Refined petroleum	l'lanned Catalytic cracking plant
PHARMACEUTICALS	AND ANTIBIOTICS			
A E. Staley Abbott Laboratories Abbott Laboratories American Cyanamid	Decatur, III N. Chicago, III N. Chicago, III Bound Brook, N. J	315,000 1,500,000	Inesitei Antibiotics Penicillia Artane	In production. Under construction. Finishing plant Certificate of necessity granted. In full scale production. Use—Parkinson's insease.
(Calco) American Cyanamid	Pearl River, N. Y	6,000,000		Under construction Will triple capacity
(Loderle) Armour	Fort Worth, Tex Chicago, Ill	850,000 11,600,000	Plasma extender Adrenocorticotropic	Under construction. Certificate of necessity granted
Armour	Kankakae, Ili		hormone Pharmaceuticals	Prepared.
Armour	Bradley, Ill. E. Syracuse, N. Y. Terre Haute, Ind.	4,300,000 475,000	ACTH, insuling etc. Penicilling Penicillin and streptomycin	Under construction. Expanded capacity. Certificate of necessity granted.
Chas, Pfizer	Brooklyn, N. Y	900,000	Penicillin and streptomycin	Certificate of necessity granted
Dan, Pfast	Groton, Conn	8,700,000	Penicillin and streptomycin	Certificate of necessity granted
Chas. Pfiser Commercial Solvents	Groton, Conn Terre Haute, Ind	750,000	Citric seid	Doubling capacity. In production. 6 crmenters
ommercial Solvente commercial Solvente lutter Laboratories lextran, Ltd. lu Pont. L. R. Squibb	Peoria, III. Terre Haute, Ind Berkeley, Calif. Orange, N. J. Pennsgrove, N. J. New Brunswick, N. J.	150,000 6,000,000 3,500,000	Vitamin Bu supplement. Plasma extender. Penicillin. Plasma extender. Methionine. Penicillin and	In production. Expanding production. Certificate of necessity granted Underway. 20,000 pints per month Under construction. Certificate of necessity granted.
Eli Lilly Eli Lilly Eli Lilly	Lafayette, Ind	19,000,000	streptomycia Penicillin Penicillin Primaquiae	Under construction. Certificate of necessity granted. In commercial production. Astimalarial. (Pharmacestirals and Antibiotics, cost.

FIRM	LOCATION	DOLLARS	PRODUCT(S)	JOB STATUS AND REMARKS
Pharmaceuticule and Antibio	tiles (cont.)			
General Aniline & Film			Polyvinyl pyrrolidine	Expanding facilities. Plasma extender.
Heyden Hoffman-La Roche J. T. Baker	Grameli, N. J	3,600,000	Penicillin	Will double capacity.
Hoffman-La Rocho	Nutley, N. J Phillipsburg, N. J	150,000	Pharmaceuticals	Under construction.
J. T. Baker	Phillipsburg, N. J	6,000,000	Penicillin	Certificate of accessity granted. In production.
Morek	Danville, Pa		Penicillin	Doubling capacity.
Merak	Danville, Pa		Nincia	Under construction. Mothyl ethyl pyridine hase
Merak Nepara Chemical	Danville, Pa. Harriman, N. Y.	1,000,000		Completing. B-complex vitamin.
Parks, Davis	Holland, Mich		Chloromycetin	Doubling capacity. Synthetic.
Riker Laboratories Schenley Laboratories	Los Angeles, Calif Lawrenceburg, Ind		Veriloid Penicillin and	In production. Boosting capacity.
Schemely Labouratories	Lawrenceourg, ma		atreptomycin	December Capacity.
Schenley Laboratories	Lawrenceburg, Ind		Polywinyl pyrrolidina	Operating. Plasma extender. 350,000 pints per m
Stauffer Chemical	Callander, Calif		Citric acid	In production. Fermentation.
Summer Chemical	Zeeland, Mich	2.500,000	Acetyl-p-aminophenol Citric acid	In tonnage production. For pain relievers. In production. Fermentation, 5 million its per
Upjohn	Kalamason, Mich	2,000,000	Nonmyein	In production.
Wallace & Tiernan	Elihart, Ind Kalamasso, Mich Bellevillo, N. J Rosseiner, N. Y		Pharmacouticals	Certificate of necessity granted.
Winthrop-Stearns	Reasslast, N. Y		Pharmaceuticals	Cartificate of necessity granted.
Winthrop-Stearns			Aralon	Boosted production from 110,000 to 265,000 lb. pyear. Antimalarial.
Winthrop-Stearns			Primaquine	Will start making. Antimalarial
DICHELES AND DV	**			
PIGMENTS AND DY	12			
Allied Chemical & Dye	Buffalo, N. Y		Military dyes	Certificate of necessity granted.
American Cyanamid	Bound Brook, N. J	800,000	Anthraquinone	Certificate of necessity granted.
C. K. Williams	E. St. Louis, Ill	1,900,000	Yellow iron oxide	Certificate of necessity granted.
CibaColumbia Chemical	Toma River, N. J	*********	Dyestuffs Calcium and magnesium	Being erected. Tripling capacity. Rubber pigments.
Common Common Transfer	Name of the state		silicates	Arthur capacity and a fagurant
Du Pont	Despwater Point, N. J		Ponsol dyes	Contract awarded. Will modernize and enlarge
Glidden	Collineville, Ill	2 000 000	Lithopone	Will increase capacity 25%.
Glidden National Lend	Baltimore, Md Sayreville, N. J	3,000,000	Titanium dioxide	Doubled capacity. Expanding production.
National Lend	Bt. Louis, Mo		Titanium dioxide	Expanding production
PLASTICS AND RES	INS			
Allied Chemical & Dye	Buffalo, N. Y	6,940,000	Polyethylene	Certificate of necessity granted.
(Semet-Solvay)	8. Point, Ohio		Urea	Certificate of necessity granted.
(Solvay) American Marietta	Sentile Week	100.000	Diseased series	Percedica
Amyz Mfg	Seattle, Wash	100.000	Plywood resisa Thermosetting molding	Expanding. In operation. 5 tons per day
			compounds	an aprilation of state per may
Atwood Adhesives	Seattle, Wash		Adhosivos	Expanded production 50%.
B. F. Goodrich Chemical Borden	Avon Lake, Obio Demopolis, Ala		Vinyl resins	In production. Expanded capacity. Under construction.
Catalia			urea resins Polystyrene	Will produce.
Catalia	Thomasville, N. C	*******	Textile-finishing resins	In operation.
Catalin	Fords, N. J.		Phenolic remins	Under construction.
Catalin	Calumet City, Del	*******	Liquid rosins	Expanded capacity.
Colton Chemical	Cleveland, Ohio		******************	Will expand from 10,000 to 50,000 lb. per month
Devoe & Raynolds	Louisville, Ky	********	Alkyd resins	In production. Cortificate of necessity granted.
Dow	Midland Mich		Styrene-butadiene	Certificate of necessity granted.
Dow	Midland, Mich	3,000,000	Polystyrene	Certificate of necessity granted.
Dow	Midland, Mish		Saran	Expanding capacity.
Dow	Freeport, Tex. Niagara Falls, N. Y.		Seran	Expanding capacity.
Du Pont	Parkersburg, W. Va		Polyvinyl alcohol	Certificate of necessity granted. Certificate of necessity granted.
	Orange, Tex	********	Polyethyleno	Doubling capacity.
Firestone Plasties	Pottstown, Pa	8,000,000	Polyvinyl chloride	Will triple capacity.
Croody war	Niagara Falls, N. Y	2,250,000	Vinyl resins	Expanded production.
Heroules	Samerah Ca		Carboxymethyleellulose. Wet strength resiss	Expanded capacity 50%.
Hereules	Savannah, Ga		Polystyrene	In operation. For paper. Increasing capacity 25%.
KoppersLibbey-Owens-Ferd	Toledo, Ohio		Alkyd molding	In operation.
Loven Chemical	Newhall, Calif	250,000	compounds Phenolic molding	In production. 1 million lb. per month.
Minnesota Mining & Mig	Hastings, Minn		eompounds Fluorocarbons	In operation. Semi-commercial plant.
Monsanto	Springfield, Mass	*********	Polyvinyl chloride	Certificate of necessity granted.
Monanto	Long Beach, Calif	470,000	Polystyrene	Cortificate of necessity granted.
Moneanto	Addyston, Ohio		Styrene and phenolic resine	Certificate of necessity granted.
Narmee, Inc	Costa Mesa, Calif	65,000	Phenolic resing	Certificate of necessity granted.
Olin Industries	Pingah Forest, N. C	20,000,000	Cellophame	In production. 38 million lb. per year.
Pitteburgh Plate Glam	Springdale, Pa		Polyester resin	Under construction. Certificate of necessity granted.
Polymer Corp Procter & Gamble	Reading, Pa Perry, Fla	21,500,000	Teflon	Certificate of necessity granted. From wood pul
(Buckeye Cotton Oil)		21,000,000		
Rohm & Hees	Bristol, Pa		Methyl methacrylate	Certificate of accessity granted.
Shell Chemical	Houston, Tex.		Epon resins	In operation.
Shawinigan Resins	Springfield, Mass		Polyvinyl alcohol Vinyl resins	Completing construction. Doubling capacity.
Union Carbide	Ashtabula, Ohio	1,600,000	Fluoroethane resins	Certificate of necessity granted.
(Carbide & Carbon) Union Carbide	8. Charleston, W. Va		Polyethylene	Doubling capacity.
(Carbide & Carbon) Union Carbide	S. Charleston, W. Va	********	Vinyl resin	In production.
				In production. Certificate of necessity granted.

FIRM	LOCATION	DOLLARS	PRODUCT(S)	JOB STATUS AND REMARKS
PULP AND PAPER				
Albermarle Paper	Roanoke Rapids, N. C	6,800,000	Pulp and paper	Proposed.
American Paper & Pulp	Filer City, Mich Berlin, N. H	1,300,000	Semi-chemical pulp Wood pulp	Expanding capacity. Certificate of necessity granted.
frown Paper Mill	W. Monroe, La	3,400,000	Paper	Expanding production.
Frunswick Pulp & Paper Suckeye Cellulase	Brunswick, Ga Perry, Fla	5,000,000 35,000,000	Bleached pulp	Expanding production from 290 to 400 tens per day Underway.
Camp Mfg	Franklin, Va	6,000,000	Pulp, kraft paper	Certificate of accessity granted.
Container Corp. of America	Canton, S. C	1,050,000 500,000	Biesched chemical pulp Paper	Certificate of necessity granted. Under construction.
Coronado Míg	Oklahoma	4,000,000	Wrapping paper	Underway. 150 tons per day. Certificate of accessity granted.
Crown Zellerbach	Camas, Wash	20,000,000	Pulp	Certificate of messenity granted. Certificate of nessenity granted.
Daylord Container	Bogalues, Wash., Parish. La.	6,200,000	Sulphate pulp	Certificate of messessity granted.
Green Bay Paper & Puin	Green Bay, Wia		Semi-chemical pulp Sulphite pulp	Expanding. Certificate of necessity granted.
Groveton Papers	Groveton, N. H. Roanoke Rapide, N. C	5,800,000	Pulp and paper	Expansion underway.
Iammermill Paper	Eric, Pa	1,000,000	PaperPulp and paper	Under construction. Doubled production.
Hudson Pulp & Paper	Palatka, Fla Natches, Miss	10,000,000	Dissolving pulps	Doubling capacity from 300 to 600 tons per day.
international Paper	Mobile, Ala	13,000.000	Chemfibre board	Completed. Semi-chemical pulping installation.
Kimberly-Clark	Rome Ga	21,000,000	Pulp and paper	Under construction. Certificate of necessity granted.
Mead	Chillicothe, Ohio	4,900,000	wood pulp	Certificate of necessity granted. 30% expansion.
Monadnoek Paper Mills National Container	Elizabethton, Tenn Valdosta, Ga	20,000,000	Paper Kraft pulp, paper	Optioned site. Ground broken. 500 tons per day of board and paper
Oregon Pulp & Paper	Salem, Ore.	730,000	Wood pulp	Under construction. Addition.
Ostego Falls Paper	Ostego, Mich	600,000	Semi-chemical pulp Paperboard	Expanding. Certificate of necessity granted.
Penobecot Chemical Fibre	Old Town Mo	820,000	Wood pulp	Certificate of accessity granted.
Potlatch Foresta Premier Pulp & Paper	Lewiston, Idahe	2,000,000	Sulphate pulp and paper Paper	In production. 130 tons per day paper. Underway.
Puget Sound Pulp & Timber	Bellingham, Wash	1,300,000	Pulp	In production.
Rayonier	Port Angeles, Wash		Cellulose	Ninth digester (stainless steel lining) in operation. Increased capacity 10%.
Rayonier	Hoquiam, Wash	3,000,000	Cellulose	Certificate of necessity granted.
Riegel-Carolina	Acme, N. C	13.500,000	Pulp mill (kraft)	Under construction. 200 tone per day.
St. Helens Pulp & Paper St. Joe Paper	St. Helens, Ore Port St. Joe. Fla.	25,000,000	Bleached pulp Kraft paper	Expansion underway. From 178 to 225 tone per day Expanding from 400 to 1,200 tons per day.
St. Marys Kraft	St. Marys, Ga	1,850,000	Bulphate pulp and kraft paper	Certificate of necessity granted.
St. Regis Paper	Jacksonville, Fla Evadale, Tex		Kraft pulp and paper Pulp and paper	Under construction. Under construction.
Union Bag & Paper			Semi-chemical pulp	In production.
United Bagasse Cellulose Waldorf Paper Products	Clewiston, Fla	15,000,000	Newsprint Semi-chemical pulp	Planned. 45,000 tone per year Expanding.
Watervliet Paper	Waterviiet, Mich N. Charleston, S. C	********	Semi-chemical pulp	Expanding.
W. Va. Pulp & Paper W. Va. Pulp & Paper	N. Charleston, S. C	3,500,000	Kraft paper Sulphate wood pulp	Certificate of necessity granted. Certificate of necessity granted.
W. Va. Pulp & Paper	Luke, Md		Semi-chemical pulp	Neutral sulphite. In partial operation.
Weyerhaeuser Timber	Everett, Wash			Under construction. 250 tons per day bleached kraft pulp. Under construction. Expanding 178%.
RUBBER	Country D F	200 000	Resistant rubber	Certificate of assessing an and
B. F. Goodrieb	Cranston, R. I		GR-8 rubber	Certificate of accessity granted. Now operating. 90,000 long tons per year.
B. F. Goodrich(Govt. contract)	Port Neches, Tex		Cold rubber	Will boost to 7,800 long tons per month.
Dewey & Almy	Aston, Mass	400,000	Special synthetic rub- bers, copolymers, special resins, plasticiers	Expansion underway.
Du Pont Firestone Tire & Rubber	Louisville, Ky	2,000,000	Neoprene Reclaimed rubber	Boosted capacity 30%. Certificate of necessity granted.
Goodyear Synthetic Rubber	Memphis, Tean	2,000,000	Cold rubber	Expanded expacity 1214%.
Midwest Rubber Reclaiming	California	1,500,000	Reclaimed rubber Reclaimed rubber	Certificate of necessity granted.
Polson Rubber	Garretaville, Ohio	130,000	GR-S rubber	Certificate of necessity granted. Boosting capacity 45% to 7,200 tons per month.
(Govt. contract) J. S. Rubber	Baton Rouge, La	**********	Buna N, latex, rubber- plastic blends	Doubling capacity.
SULPHUR AND SUI	LPHURIC ACID			
Allied Chemical & Dye		9,000,000	Sulphurie seid	Planned.
(General Chemical)	Newark, N. J	7,000,000	Sulphurie acid	Certificate of necessity granted.
(General Chemical) Allied Chemical & Dye (General Chemical)	Newell, Pa	2,000,000	Sulphurie sold	Certificate of necessity granted.
(General Chemical) Allied Chemical & Dye (General Chemical)	North Claymont, Del	3,800,000	Sulphurie asid	Certificate of necessity granted.
(General Chemical)	E. St. Louis, Ill		Sulphurie seid	Undorway. From acid sludge.
merican Smelting & Refining	Taeoma, Wash	900,000	Sulphurie aeld	Certificate of accessity granted.
American Smelting & Refining	Corpus Christi, Tex	3,200,000	Sulphurie acid	Certificate of necessity granted. Certificate of necessity granted.
Sethiehem Steel	Sparrows Point, Md	4,000,000	Bulphurie and	Certificate of necessity granted.
	Dumas, Tex	********	Sulphur	In operation. From sour gas.
Canadian River Gas	Houston, Tex	400,000	Sulphur	Certificate of necessity granted.
	Houston, Tex		Sulphurle seid	Certificate of necessity granted. Under construction. 400 tons per day. From acid

FIRM	LOCATION	DOLLARS	PRODUCTS(S)	JOB STATUS AND REMARKS
Sulphur and Sulphuric Acid (cont.)			
Continental Sulphur &	Sunlight Basin, Wys		Sulphur	Recovery from low-grade ores via Chemiso proces
Phosphate Detroit Chemical	Detroit, Mich	950.000	Sulphuric acid	For phosphorie production. Certificate of necessity granted.
Piltrol	Salt Lake City, Utah	120.000	Sulphuric acid	Reclaimed. Certificate of necessity granted.
Freeport Sulphur	Terrebonne Parish, La	4,000,000	Sulphur	Certificate of pecessity granted.
reeport Bulphur. reeport Sulphur.	Garden Island Bay La	15,000,000	Sulphur	Under construction. Sulphur mine. Largest sing
	W		Sulphur	deposit discovered in 20 years. Developing Nash dome.
resport Sulphur	Houston, Tex	6,780,000	Sulphurie acid	Boosted production from 250 to 800 tons per day
The same of the sa				From smelter gas.
Gulf Oil	Port Arthur, Tez	2,300,000	Sulphurie acid	Certificate of necessity granted
Julf Oil	Waddell, Tex		Sulphur	Planned. 20 tons per day. For sulphurie acid
Iancock Chemical	Los Angeles, Calif,	280,000	Sulphur	alkylation. Certificate of necessity granted. From refinery.
TRANSPORT CONTRACTOR				games.
nternational Minerals &	Mason City, Ia		Sulphurie acid	In operation. 75 tons per day. For fortiliser,
Chemical nterstate Chemical	Cody, Wyo		Sulphur	Planning. Recovery from sulphur-bearing deposits
offerson Lake Sulphus	Starke, La.		Sulphur	Developing mining facilities,
offerson Lake Sulphur	Starke, La		Bulphur	Production started. 100,000 tens per year.
iberty Powder	Baraboo, Wis		Sulphuric and aitric acid	Re-activated.
ion Oil	Emory, Tex		Sulphur	Underway. From sour gas.
ion Oil	Stamps, Ark		Sulphur	In production. From sour gas. 10 tons per day. Certificate of necessity granted.
elsamie ties themping	NIARDOUR, AFE.		Sulphur.	Underway. From sour gas. 150 tons per day.
lichigan Chemical	St. Louis. Mich Odensa, Tex	100,000	Sulphurle acid	Certificate of accessity granted.
dema Natural Gasoline &	Odenea, Tex	200,000	Sulphur	Underway. From natural gas
Sid Richardson Carbon enhody Coal	Illinois		Sulahus	Considering Process from and mine and
hillips Chemical	Illinois Funica, N. M	1,500,000	Sulphur	Considering. Recovery from eval mine wastes. Cortificate of necessity granted.
Million Chemical	Goldsmith, 10x	1,250,000	Sulphur	Underway. From sour gas. 100 tons per day
hillipa Chemical	Crane, Tex	800,000	Sulphur	Certificate of necessity granted.
ayomer, Crown	Wyoming.	1,300,000	Sulphur	Certificate of necessity granted.
Zellerbach, Soundview	Dumas, Tex	200,000	Sulphur	Certificate of necessity granted. 25 tens per day
bell Chemical	Houston, Tex.	500,000	Sulphur	Certificate of pecessity granted.
nclair Refining	Houston, Tex	320,000	Sulphur.	Certificate of necessity granted.
andard Oil (Ind.)	Whiting, Ind		Sulphur	Under construction. 55 tons per day.
anolind	Sundown, Tex		Sulphur	Under construction. 40 tons per day. From cases, bead gas.
auffer .	Richmond, Calif	300,000	Sulphurie acid	Certificate of necessity granted. 200 tons per day
auffer	Compton, Cast	180,000	Oleum	Certificate of necessity granted
auffer exac City Chemicals	Texas City, Tex	5,000,000	Sulphurie seid and dical-	
	NY - 1 - 1 NY		cium phosphate	l'lanned.
exas Gulf Sulphur	Worland, Wyo	8,000,000	Sulphur	In full production. 300 tons per day Developing sulphur mining facilities
exas Gulf Sulphur	Mose Bluff Mine	0.0001000	Sulphur	Will boost production 50%
SYNTHETIC FIBERS				
elancee	Rock Hill, S. C.	20,000,000	Acctate fiber	Planned. Addition to plant.
bemstrand	Penescola, Fla	88,000,000	Nyloa	Under construction. 80 million lb per year
DESIRED OF THE PARTY OF THE PAR	Decatur, Ala	25,000,000	Aerilan	30 million lb. per year. Under escatruction
Courtankis, Ltd.	Mobile, Ala	11,000,000 24,000,000	Rayon staple	Proposed. 80 million lb. per year initially. Under construction. 10 million lb. per year co
Pu Pont	Killinton, N. C.	24,000,000	Daeron	tinuous filament, 25 million lb. per year staple at
				low
Du Pont	Seaford, Del.		Nylon.	Latest expansion about completed,
Ou Pont	Martineville, Va Chattanooga, Tenn		Nylon	Latest expansion about completed
Du Pont	Canden S C		Nylon	Latest expansion about completed Completing construction.
hi Pont	Camden, S. C Buffalo, N. Y.	1.900,000	Kayon,	Increasing production of high-tenucity viscose yar
	Nashville, Tenn	1,000,000	Fiber glam	Under construction
bbey-Owens-Ford	Nashville, Tenn Parkersburg, W. Va		Fiber glass	In production.
forth American Rayon	Childenburg, Ala	3,000,000	Viscose rayon	Under construction. 27 million ib per vegt
wene-Corning Fiberglas	Anderson, S. C. Charleston, W. Va	3,000,000	Fiber glass	Under construction Doubled capacity,
(Carbide & Carbon)	Charleston, W. Va.		Dyma	Living California 1
nion Carbid	South Carolina		Dynel	Planned
(Carbide & Carbon) Orginia-Carolina	Taftville, Conn		Vicara	Expanding expants
rigina Carouna	A district, Colon			Estation along
SYNTHETIC ORGAN				
ur Reduction	Louisville, Ky Philadelphia, Pa	1,000,000	Acetylene	Certificate of necessity granted Under construction. From current
(Barrett)		3,000,000	t tomate.	25 million lb. per year.
Allied Chemical & Dye (Barrett)	Marietta, Ohio		l'henol	Now operating at design capacity
Allied Chemical & Dye	Chicago, Ill	4,500,000	Phthalie anhydride	Under construction. 25 million lb. per vens
(Barrett) Allied Chemical & Dye	Philadelphia, Pa	3.800,000	Phthalic anhydride	Planned. 36 million lb. per year
(Barrett) American Cyanamid	Willow Island, W. Va			Planned. Expanded facilities.
American Cyanamid	Warners, N. J.		Melamine Cyanurie chloride	First commercial unit in operation
American Cyanamid	FROM OTHERDIN, LAB.	47.740.UUU	Aerylonitrile	Certificate of necessity granted.
American Petrochemical	Lake Charles, La	20,000,000	Ethylene and ethylene	
Ameril .			chemicals	Starting construction.
Amoul Atlantic Refining	Philadelphia, Pa	5,600,000	Methyl chloride	Boosted capacity 28% Certificate of necessity granted.
Islan Dunden	Wilmington, Del	5,000,000		Capacity doubled a second time. New 75 mattern I
				per year.
	Shreveport, La	3,300,000	Bensene	
Atlas Processing				Under construction. Platforming. 17,600 gal. p day.
Atlas Processing Aromatics Refining				

R. F. Goolfold Rorden. The Carlage Represent Contraction Contract	PIRM	LOCATION	DOLLARS	PRODUCT(S)	JOB STATUS AND REMARKS
Coltames Brown City Particle Particl	Synthetic Organies (cont.)				
Garbanes Blobo, Tex. Galasses	B. F. Goodrich Borden	Calvert City, Ry	5,000,000 600,000	Vlayl chloride	
Cities Bervies. E. Chiane, Ind. Lac Charler, La. Charle	Carthage Hydrocol	Brownsville, Tex		Synthesis gas products	First units in operation.
Cities Burvies. E. Chinam, Ital. Lair Charles, La. Armantian Procession (1998) A Armantian Columbia Supplement Big Spring, Twa. 2,000,000 Coven Petroloum Big Spring, Twa. 2,000,000 Deep Ruch Oil Charles, La. No.000,000 Delta Channial Polacinal Pola	Celanese	Pampa, Tex	6.000,000	Organic chemicals	Under construction. Similar to Bishop plant.
Clium Servies. Take Charles, La. Arematies. Process 10,000 bits, prod special guild. Columbia-Southern. Till Spring, Tex. 2,100,000 Dough Petrolum. Till Spring, Tex. 2,100,000 Dough Red Ol. Count Contral Petrolum. Process 1, 10,000,000 Dolla Chamisal. Potate is Habb. La. 30,000,000 Dolla Chamisal. Potate is Habb. La. 30,000,000 Dolla Chamisal. Potate is Habb. La. 30,000,000 Dolla Chamisal. Palacorillo. Olio. Carbon terreduloide. Palacorillo. Olio. Palacorillo. Olio. Palacorillo. Olio. Propert, Tex. 20,000,000 Dov. Midland. Mith. Dov. Midland. Mi		Bishop, Tex	9,000,000	Organic chemicals	
Climbig-Goulders Couloning-Goulders Couloning-Gould	Cities Service	E. Chicago, Ind		Aromaties	Designing. Fluid hydroforming unit.
Columbia Southern. Convent Contact Performant Penderna. Text. 955.000 Diagnost. Conventional Penderna. Text. 955.000 Diagnos	Cities Service	Lake Charles, La	********	Aromatics	Designing Co. 000 bil ave down
Content Courtain Performant Perfo	Columbia-Southern		**********	Chlorbensens	Certificate of necessity granted.
Delanond. Diamond. Di	Crown Central Petroleum	Pasadena. Tex	265,000	Ethylene, propane,	
Diamond. Chicheated parafflias. Viny dishibites. Viny dishibite	Deep Rock Ol	Cushing, Okla Pointe a la Hache, La	3,250,000 30,000,000	Ethane, propane, ethylene	Certificate of necessity granted. Planned. From natural gas. Conversion to ethylene
Dancold National College Services of the College Servi	Diamond			Chlorinated paraffins	Expanding production. Will build. Shell Chemical to supply ethylene.
Dancold National College Services of the College Servi	Diamond			Carbon tetrochloride	Expanding production.
Dow Milland, Mieh 1,000,000 Wester Milland, Mieh 5,000,000 Millord, Mieh 15,000,000 Millord, Millord, Mieh 15,000,000 Millord, Millord, Mieh 15,000,000 Millord, Millord, Mieh 15,000,000 Millord, Millo	Diamond.	Painesville, Ohio	670,000	Perehlorethylene	Will build unit.
Dow Milland, Mieh 1,000,000 Wester Milland, Mieh 5,000,000 Millord, Mieh 15,000,000 Millord, Millord, Mieh 15,000,000 Millord, Millord, Mieh 15,000,000 Millord, Millord, Mieh 15,000,000 Millord, Millo	Dow	Midland, Mich	10.241.000	Methyl styrene	Under construction. Substitute for styrene. Made from toluene instead of scarcer bensene.
Dow Midland, Mish b. Dow Midland, Mish b. Dow Midland, Mish b. Dow Midland, Mish b. Dow Freeport, Tex b. 5,600,000 Expending, 20% increase. Dow Midland, Mish b. Dow Midland, Mish b. Dow Corning Midland, Mish b. Dow Post Arthur, Tex b. 20,000,000 Displication of the Midland, Mish b. Dow Corning Midland, Mish b. Dow Midland,	Dow	Freeport, Tex	23,000,000	Glycol, vinylidine and vinyl chloride, styrene	
Dow Midland, Mish S. 5, 500,000 Elysjenso. Presport, Tex. 5, 500,000 Elysjenso. Dow Corning Midland, Mish S. 5, 500,000 Elysjenso. Dow Corning Midland, Mish S. 500,000 Elysjenso. Du Pont Depth Depth Cyteoria, Fra. Allponitrile Lyteoria, Fra. Allponit	Dow		1,400,000	Bromine and ethylene	Certificate of pecessity granted
Dew. Midland, Mish 10, 241,009 Methyl etryces. Underway. Dev. Coming. Presport, Test 10, 241,009 Methyl etryces. Dev. Coming. Presport, Test 10, 241,009 Methyl etryces. Dev. Coming. Presport, Test 10, 241,009 Methyl ethyl		Midland, Mich		Ethanolamines	Expanding. 30% increase.
Dew. Midland, Mish 10, 241,009 Methyl etryces. Underway. Dev. Coming. Presport, Test 10, 241,009 Methyl etryces. Dev. Coming. Presport, Test 10, 241,009 Methyl etryces. Dev. Coming. Presport, Test 10, 241,009 Methyl ethyl	Dow.	Midland, Mich	5 600 000	Ethylene	Underway. Hypersorber.
Doe Coming Medical Action (1997) And the property of the post of t	Dow.	Midland, Mich	10.241.000		Under countraction.
Du Pont Victoria, Tex. Du Pont Victoria, Du Pont Vict	Dow.	Freeport, Tex	000.000	Mothyl chloride	Underway.
Du Pont. Niagans Falla, N. Y. O. Adiponitrile. Underway. From furtural. Expanding. Will double capacity. Expanding. Expanding. Will double capacity. Expanding. Expanding. Expanding. Control of Contr	Du Pont	Deepwater Point, N. J		Tetraethyl lead	Expanding to 50 million lb. per year
Du Pont. Niagura Falls, N. Y. O. Adliponitrile. Underway. From furtural. Expanding. Will double capacity. In production. Piers of the Chlorobromomethan Pathyl Corp. Edgewood, Del. 200,000 Tetractival lead. Under construction. Certificate of necessity granted. Certificate of nec	Du Pont	Victoria, Tex.		Adiponitrile	Evpanding to 50 million lb. per year
Du Pont. Niagara Falla, N. Y	Du Pont	Gibbstown, N. J.		Dimethyl terephthalate	Expanding. For Dacron.
Esten Chemicals Los Angeles, Calif Houston, Ten. Houston, Ten. Houston, Ten. 4 0,00,000 Petrachyl lead. Tersas. Service Carn. Ceneral Relectic Great Southern Chemical. Pet Arthur, Tex. 4,000,000 General Electric Great Southern Chemical. Pet Arthur, Tex. 4,000,000 Tersas City, Ten. 4,000,000 Elegrican. South Coll. For Marking Marking Carnella, N. South Collins of Marking Carnella, N. South Carnella, N. South Carnella, N. South Chemical. For Marking Marking Chemical. Pet Arthur, Tex. South Coll. For Marking Marking Carnella, N. South Carnella, N. South Carnella, N. South Chemical. For Marking Carnella, N. South Chemical. For Marking Marking Chemical. For Marking Marking Marking Carnella, Part Neckon, Tex. Hydrocarbon Chemical. For Marking Marking Marking Marking Marking Marking Chemical. For Marking	Du Pont	Niagara Falls, N. Y		Adiponitrile	Underway. From furfural.
Ethyl corp. Baton Rouge. La Ethyl compounds Sigrams Certificate of necessity granted. Certificate of necesity granted. Certificate of necessity granted. Certificate of necessity granted. Certifi	Dures		6,400,000	Phenol	Expanding. Will double capacity.
Ethyl corp. Baton Rouge. La Ethyl compounds Sigrams Certificate of necessity granted. Certificate of necesity granted. Certificate of necessity granted. Certificate of necessity granted. Certifi	Eston Chemicals	Los Angeles, Calif	44 000 000	Chlorobromomethane	In production. Fire extinguishing agent
Ethyl Corp. Baton Rouge. La. Tezas. Sepreme. General Electric General Electric Great Southern Chemical. Corpus Christ, Tes. 4.000,000 Great Selectric Great Southern Chemical. Corpus Christ, Tes. 4.000,000 Great Selectric Great Southern Chemical. Devit Arthur, Tes. 4.000,000 Harcaise. Harcaise. General Electric Great Southern Chemical. Corpus Christ, Tes. 4.000,000 Harcaise. Great Southern Chemical. Corpus Christ, Tes. 4.000,000 Harcaise. General Electric Great Southern Chemical. Fordan. Garfield, N. J. Turner, S.		Edgewood, Del	200,000	Tetraethyl lead	Certificate of necessity granted.
Control Alliline & Filin Control Chemical Corpus Christi, Tex. 4,000,000 Gulf Oil. Port Arthur Tex. 12,000,000 Gulf Oil. Port Arthur Tex. 12,000,000 Hancock Oil Long Beach, Calif 4,000,000 Harcuins. Orafield, N. J. 1,175,000 Herdin. Orafield, N. J. 1,175,000 Herdin. Orafield, N. J. 1,175,000 Hargodon. Orafield, N. J. 1,200,000 Hargo		Baton Rouge, La		Ethyl compounds	Certificate of necessity granted.
Great Suchers Chemical Corras Southers Chemical Coulf Oil. Fort Arthur, Tex. 3, 500, 600 Hancook Oil Long Beach, Calif 1, 600, 600 Hardon Hard		Texas		Acetylene derivatives	Planning. For plantics plant at Leominator, State Planned. Commercial plant.
Harcuiss. Harcuiss. Garfield, N. J. 1, 175, 600 Heyden. Garfield, N. J. Resortind, Parachlorobensaldehyde Resortind, Parachlorob	General Electric			Methyl chloride	Expanding capacity.
Harcuins. Hirrolins. Hervins. Hervins. Hervins. Garfield, N. J. 1.175.000 Hervins. Hervins. Garfield, N. J. 1.175.000 Hervins. Hooker-Detree: Hook	Great Southern Chemical	Corpus Christi, Tex	4.000,000	Benzene and toluene	Certificate of necessity granted
Hereuits. Garfield, N. J. 1,775,000 Pentassythrited. Completing expansion. Under construction. Panned. Prom. cumens. Also acetone, para-eresol Completing expansion. Under construction. Panned. Prom. cumens. Also acetone, para-eresol Completing expansion. Under construction. Prom. tokens.	Gulf Oil.	Port Arthur, Tex	12,000,000	Ethylene	Inder construction 214 billion on ft. per year
Heyden			2,000,000	Ethylene glycol and ethanolamines	Under construction.
Hougeton Plains Gas & Oil. Tyrone, Okia. 120,000 leaving the land of the property of the land of the l	Hercules,	Coefold N. I	5.000,000	Phenol	Planned. From cumene. Also acctone, para-resor
Houghton Plains Gas & Oil. Tyron, Okia. 120,000 Indohutane. Certificate of necessity granted. In limited operation. From tokene. Fine mesent in limited operation. Fro	Heydon	Fords, N. J		Parachlorobenzaldehyde	Under construction.
Hougeton Plains Gas & Oil. Tyrone, Okia. 120,000 leaving the land of the property of the land of the l	Heyden	Garfield, N. J		Resorcinol	Doubled espacity to 600,000 lb per year
Jefferson Chemical Port Neches, Tex Ethanolamines Expanding, Certificate of pecasity granted. Jefferson Chemical Port Neches, Tex Ethanolamines Expanding, Certificate of pecasity granted. Jefferson Chemical Port Neches, Tex Ethanolamines Expanding, Certificate of pecasity granted. Kendall Refining Bradford, Pa 9,000,000 Coppers Port Arthur, Tex 9,000,000 Coppers Port Arthur, Tex 9,000,000 Coppers Cop	Humaton Plains Gas & Oil		1.500.000	Trichlorethylene	Certificate of necessity grantes.
Jefferson Chemical Port Neches, Tex Ethanolamines Expanding, Londer construction. Platforming unit. Certificate of necessity granted. Certific	Humble Oil & Refining	Baytown, Tex		Toluene, xylene	Curtificate of necessity granted.
Lefferson Chemical Port Neebes, Tex Ethylene gives Estylene gives Certificate of necessity granted Under construction. Coal-far heazene insu Pittaburgh.		Newark, N. J.		Para-ererol	cides.
Kenders Bradford, Pa. 9,000,000 Fivyl benness. Coal-tar bename from Pattorning unit. Koppers Port Arthur, Tes 0,500,000 Fivyl benness. Coal-tar bename from Pittaburgh. Koppers Petrolia, Pa Recording Uniter construction. Coal-tar bename from Pittaburgh. Koppers Koppers Roppers Robusta. Pa Recording Uniter construction. Coal-tar bename from Pittaburgh. Koppers Roppers Robusta. Pa Recording Uniter construction. Minnesota Mining & Mfg Langdon, Minn. 470,000 Chemical Para City, Tex Styres. Styres. Styres. Styres. Certificate of necessity granted. Monamato. St. Louis, Mo. 1, 245,000 Meleic anhydride Certificate of necessity granted. Monamato. Texas City, Tex 26,000,000 Monamato. Texas City, Tex 8,000,000 Monamato. Texas City, Tex 9,000,000 Monamato Monamato Monamato Monamato Monamato Monamato Monamato Monamato	Jefferson Chemical	Port Neches, Tex		Alkyl phenol	Under construction.
Kenders Bradford, Pa. 9,000,000 Fivyl benness. Coal-tar bename from Pattorning unit. Koppers Port Arthur, Tes 0,500,000 Fivyl benness. Coal-tar bename from Pittaburgh. Koppers Petrolia, Pa Recording Uniter construction. Coal-tar bename from Pittaburgh. Koppers Koppers Roppers Robusta. Pa Recording Uniter construction. Coal-tar bename from Pittaburgh. Koppers Roppers Robusta. Pa Recording Uniter construction. Minnesota Mining & Mfg Langdon, Minn. 470,000 Chemical Para City, Tex Styres. Styres. Styres. Styres. Certificate of necessity granted. Monamato. St. Louis, Mo. 1, 245,000 Meleic anhydride Certificate of necessity granted. Monamato. Texas City, Tex 26,000,000 Monamato. Texas City, Tex 8,000,000 Monamato. Texas City, Tex 9,000,000 Monamato Monamato Monamato Monamato Monamato Monamato Monamato Monamato	Jefferson Chemical	Port Neches, Tex		Ethanolamines Ethylena alwed	Certificate of peacemity granted
Respect	Kendall Refining	Bradford, Pa		Aromatics	Under construction. Platforming unit.
Note Note	Koppers		6.500.000	trough comments	
Mathieson Hydrocarbon Chemical Minnesota Mining & Mfg Langdon, Minn Minnesota Mining & Mfg Langdon, Minn Monanato Tenas City, Ten Monanato Monanato Tenas City, Ten Monanat	Koppers	Petrolia, Pa Kobuta, Pa		Resoreinol .	Fourth and last unit re-activated. Ethanol-base
Minnesota Minnig & Mfg Monanato Texa City, Tex Monanato St. Louis, Mo. 1.345,000 Monanato St. Louis, Mo. 1.345,000 Monanato Texa City, Tex 26,000,000 Monanato Texa City, Tex 8,000,000 Monanato Texa City, Tex 92,000,000 Textificate of necessity granted. Certificate of necessity	(Govt. contract) Mathieson Hydrocarbon	Bradenburg, Ky	17.000.000	nane, butane, natural	
Monanato St. Louis, Mo. 1.345,000 Monanato St. Louis, Mo. 1.345,000 Monanato Texas City, Tex. 25,000,000 Monanato Texas City, Tex. 8,000,000 Ethylene chemicals, propans, butane, gasoline. Methyl ethyl princip In production. From natural gas Under construction. From natural gas Under construction. Expanding Detergent alkane Expansion planned. Expansion underway. Fan American Southern Destreban, La Polybutene, propylene textamer Under construction. Pai American Southern El Dorado, Ark Polybutene, propylene textamer Under construction. From natural gas Under construction. Expansion planned. Ex	Minnesota Mining & Mfo	Landon Minn	470,000	meoline	In partial operation.
Nepara Chemical Nepara Chemica	Monanto	Tenas City, Tox	970,000	Styrene	Certificate of necessity granted.
Nepara Chemical Nepara Chemica	Monsanto	St. Louis, Mo	1,345,000	Maleic anhydride	Certificate of necessity granted
Nepara Chemical Nepara Chemica	NE comments:	Texas City, Tex	8,600,000	Styrene	Certificate of pecessity granted
Nepara Chemical Nepara Chemica	Monsanto	Texas City, Tex	13444444	Acetylone	Under construction. From natural gas
Oracite. Richmond, Calif. 1.500.000 Detergent alkane Expansion planned. Fan American Southern Destreban, La Aromatican Fundamentan Southern El Dorado, Ark Palybutene, propylemeterance. Philips Chemical. Houston Ship Channel, Tex. 3.000.000 Printlemental Reilly Tar & Chemical Southern Fundamental Southern Fundamental Reilly Tar & Chemical Fundamental Fu		I disoute, and	32.000.000	pane, butane gasoline	Under construction.
Pan American Pan American Pan American Pan American Southern Destreban, Le Aromatican Pan American Southern Pa	Nepara Chemical	Harriman, N. Y		Methyl ethyl pyridine	In production.
Pan American Pan American Pan American Pan American Southern Destreban, Le Aromatican Pan American Southern Pa	Oronite	Richmond, Calif	1,500,000	Detergent alkane	Expansion planned.
Pan American Southern El Dorado, Ark Polybutene, propylene tetramer Under construction. Phillips Chemical Houston Ship Channel, Ten 3,000.000 Pyridines, picolines, utidenes, picolines, utidenes, picolines, utidenes will turn out in volume by 1933. Railly Tar & Chemical Synthetic pyridine. Will turn out in volume by 1933. HCN Capacity doubled.	Pan American	Teras City, 102	1.100.000	Benzene	Expansion underway
Philips Chemical. Houston Ship Channel, Fen. 3,000,000 Fyridines, geotimes, utidenes. Under construction. Reilly Tar & Chemical. Synthetic pyridine. Will turn out in volume by 1933. Rohm & Hass. Houston, Tex. HCN Capacity doubled.	Pan American Southern	El Dorado, Ark		Pelybutene, propylene	
Rohm & Hass Houston, Tex HCN Capacity doubled.	Phillips Chemical	Houston Ship Channel, Tex	3,000,000	Pyridiass, pasolines.	
noum & mass Houston, 18x HCN Gapacity doubled. (Synthetic Organics, cont.)	Reilly Tar & Chemical	Warner War	*********	Synthetic pyridine	Will turn out in volume by 1953.
	roum & Hass	HOUSEON, 19X		HCN	Gapacity doubled. (Synthetic Organics, cont.)

FIRM	LOCATION	DOLLARS	PRODUCT(S)	JOB STATUS AND REMARKS
Synthetic Organics (cont.)				
Rohm & Hass	Houston, Tex	*******	Acetone, cyanhydrin Xylenes, bensene,	Certificate of accessity granted.
Roosevelt Oil & Refining	Mount Pleasant, Mich		Aylenes, bensene, toluene	Under construction. Platforming unit. Udex solvent extraction process.
Shamroek	*******************		Petroleum hydrocarbons	Certificate of necessity granted.
	Wyandotte, Mich.		Akylamines Ethyl chloride	In production. Expanding.
Shell Chemical Shell Chemical	Houston, Tex Wood River, Ill.		Dodecyl bensene	In production. For synthetic detergents.
Shell Chemical	Houston, Tex		Synthetic glycerine	Expanding. 80% boost.
Shell Oil	Houston, Tex		Aromatics	Underway. Platforming unit. 630,000 gal. per day naphthas.
Shell Oil	Wood River, Ill		Aromatics	Underway. Platforming unit. \$30,000 gal. per day naphthas.
Southern Alkali	Barberton, Ohio.		Perchlorethylene	Certificate of necessity granted.
Southern Alkali	Natrium, W. Va	10,000,000	Monochlorobensene	Certificate of necessity granted.
Standard Oil (Calif.)	El Segundo, Calif	4,000.000	Bensene, toluene Phenol	Under construction. Platforming unit. Planned. From cumene. 37 million lb. per year.
	Richmond, Calif	1,500,000	Detergent alkane	Will expand to 3,000 bbl. per day.
Standard Oil (Calif.) Standard Oil (Ind.)	Richmond, Calif	1,079,400	Retizene Olenn concentrate	Certificate of necessity granted. Building. For inc-cetyl alcohol.
Standard Oil (Ind.)	Wood River, Ill	2,500,000	Ino-octyl alcohol	Under construction,
Standard Oil (Ind.)	Whiting, Ind	*******	Bentene	On stream. 11 million gal. per year.
Standard Oil (N. J.)	Baton Rouge, La	35,000,000	Alcohols, butadiene,	Will boost to 16. Hydroforming. Will expand.
Standard Oil (Ohio)	Lima, Ohio	8,500,000	hensene Aromaties	Planned. Catalytic reforming.
Stauffer	Monongabela, Pa	********	Carbon bisulphide	Certificate of necessity granted.
Stauffer	Louisville, Ky	2,500,000	Carbon tetrachloride	Optioned land.
Sun Oil	Toledo, Ohio	******	Aromatics	Planned. Platforming unit. 10,000 bbl. per day naphthas.
Sun Oil	Mareus Hook, Pa	8,380,000	Bensene, toluene	Underway. Houdriforming unit.
Taylor Refining	Corpus Christi, Tex	3,200,000	Bennene, toluene	Certificate of necessity granted.
Texas Eastman Texas Eastman	Longview, Tex	11,600,000	Synthetic ethanol Isobutyraldehyde	Under construction. In production. One process.
Thiokol	Trenton, N. J	600,000 400,000	Chloroethylformal Synthetic rubber	Certificate of necessity granted. Underway.
			ehemicala	
U. S. Govt Union Carbide	Borger, Tex		Vinyl toluene	Will make. In production. From cumens.
(Hakelite) Union Carbide	So. Charleston, W. Va	686,000	Triethylhexylphosphate	Certificate of necessity granted. Will more than
(Carbide & Carbon) Union Carbide	Institute, W. Va		Methyl ethyl pyridine	double output of plasticizer. Under construction.
(Carbide & Carbon) Union Carbide	Institute, W. Va		Synthetic ethanol	
(Carbide & Carbon)				Planned. Large expansion. From natural gas.
Union Carbide	Texas City, Tex		Acceptant	Figured. Let'lle existences. From Marine gas.
VEGETABLE OILS				
A. E. Staley	Painesville, Ohio	*******	Soybean oil	In production. 10,000 bu. per day soybeans.
Adolphus Rice Mills Dansen Grain & Milling	Houston, Tex	500,000	Rise oil	14 tons per day oil. Hexane solvent. In production. Rotocel extractor. 130 tons per day.
Funk Bros	Bioomington, III		Vegetable oil	In production. Large solvent extraction plant.
General Mills	Rounford, Ohio	2,000,000	Soybean oil	Completing construction. Rotocel extractor. 250 tons per day.
Glidden	Los Angeles, Calif	300,000	Vegetable oil	In production,
Pacific Vegetable Oil	Richmond, Calif		Vegatable oil	In production. Continuous refining. Soda ash
8. A. Camp	Carvelo, Calif		Cotton oil	In operation. 100 tons per day cottonseed.
Hhellabarger Milla	Decatur, Ill		Vegetable oil	In operation. 100 tens per day cottonseed. In production. Solvent extraction.
Union Oil Mill	W. Monroe, La		Cottonseed oil	Under construction. 100 tons per day cottonseed. Solvent extraction and prepressing.
Western Cotton Oil	Phoenix, Aris	*******	Cottonseed oil	Planned. Solvent extraction plant, 400 tons per
Western Cotton Oil				day cottonseed.
	Bakersfield, Calif	********	Cottonweed oil	Planned. Solvent extraction plant. 400 tons per
Western Cotton Oil	Bakersfield, Calif		Cottonwed oil	Planned. Solvent extraction plant. 400 tons per day cottonseed. Under construction.
				day cottonseed.
OTHERS Air Reduction		2,000,000		day cottonseed. Under construction. Under construction. Initial capacity: 142,500 tens
OTHERS Air Reduction	Lubbock, Tex	2,000,000	Cottonseed oil	day oottonseed. Under construction. Under construction. Initial capacity: 142,500 tens per year.
OTHERS Air Reduction. (National Carbide) Allied Chemical & Dyo	Lubbock, Tex	2,000,000 10,000,000 2,800,000	Calcium carbide Ammonium bicarbonate.	day cottonseed. Under construction. Under construction. Initial capacity: 142,500 tess per year. Doubling capacity.
OTHERS Air Reduction (National Carbide) Allied Chemical & Dyo. (Solvay) American Metallic Chemicals	Lubbock, Tex	2,000,000 10,000,000 2,500,000 500,000	Calcium carbide Ammonium bicarbonate. Metallic chemicals	day cottonseed. Under construction. Under construction. Initial capacity: 142,500 tons per year. Doubling capacity. Leaced property.
OTHERS Air Reduction. (National Carbide) Allied Chemical & Dyo	Lubbock, Tex	2,000,000 10,000,000 2,800,000	Cottonsed oil	day cottonseed. Under construction. Under construction. Initial capacity: 142,500 tens per year. Doubling capacity.
OTHERS Air Raduction (National Carbide) Alliad Chemicol & Dyo. (Bolvay) Amariana Metallic Chemicale Buffalo Electrochemical Buffalo Electrochemical C. P. Hall	Lubbock, Tex. Calvert City, Ky. Syracuse, N. Y. Portland, Ore. Vancouver, Wash. Tonawanda, N. Y.	2,000,000 10,000,000 2,800,000 500,000 4,625,000	Calcium carbide Ammonium bicarbonate. Metallis chemicals Hydrogen peroxide	day cottonseed. Under construction. Initial capacity: 142,500 tons per year. Doubling capacity. Leased property. Nearing completion. Certificate of necessity granted. Completing.
OTHERS Air Raduction (National Carbide) Alliad Chemicale Dye. (Solvay) Amariean Metallie Chemicale Buffalo Electrochemical C. P. Hall Cerium Metals.	Lubbock, Tex. Calvert City, Ky. Syracuse, N. Y. Portland, Ore. Vancouver, Wash. Tonswanda, N. Y. Chicago, Ill. Niagara Falls, N. Y.	2,000,000 10,000,000 2,500,000 4,025,000 1,450,000	Cottonseed oil	day contonseed. Under construction. Initial capacity: 142,500 tens per year. Doubling capacity. Leased property. Mearing completion. Cortificate of necessity granted. Completing. Mearing completion.
OTHERS Air Raduction (National Carbide) Alliad Chemical & Dyo. (Solvay) Amariana Metallic Chemicals Buffalo Electrochemical. Buffalo Electrochemical. C. P. Hall Cerium Metals Corning Glass Culliana Zentite	Lubbock, Tex. Calvert City, Kr. Syracuse, N. Y. Portland, Orc. Vancouver, Wash. Tonawanda, N. Y. Chicago, III. Niagara Falla, N. V. Danville, K.	2,000,000 10,000,000 2,800,000 500,000 4,025,000 1,450,000	Cottonseed oil	day cottonseed. Under construction. Initial capacity: 142,500 tons per year. Doubling capacity. Leased property. Nearing completion. Certificate of necessity granted. Completing. Nearing completion. Under construction.
OTHERS Air Raduction (National Carbide) Allied Chemical & Dyo. (Bolvay) Amariana Metallie Chemicale Buffalo Electrochemical. Buffalo Electrochemical. C. P. Hall Cerium Metals. Corning Glase Culligan Zeolite. Davison Chemical	Lubbock, Tex. Calvert City, Ky. Syracuse, N. Y. Portland, Ore. Vancouver, Wash. Tonawanda, N. Y. Chicago, Ill. Niagara Falls, N. V. Danville, Ky. San Bernardino, Calif. Curtis Bay, Md.	2,000,000 10,000,000 2,800,000 4,925,000 1,450,000 100,000 100,000 110,000	Cottonseed oil	day cottonseed. Under construction. Initial capacity: 142,500 tons per year. Doubling capacity. Leased property. Nearing completion. Cordificate of necessity granted. Completing. Nearing completion. Under construction. In production. 3 million lb. per year. Certificate of necessity granted.
OTHERS Air Radiastion (National Carbide) Alliad Chemical & Dyo. (Bolvay) Amarinan Metallia Chemicals Buffalo Electrochemical Buffalo Electrochemical C. P. Hall Cerium Metals Corolog Glass Culligan Zoolite Davison Chemical Davison Chemical	Lubbock, Tex. Calvert City, Ky. Syracuse, N. Y. Portland, Orc. Vancouver, Wash. Tonawanda, N. Y. Chicago, Ill. Niagara Falle, N. Y. Danville, Ky. San Bernardino, Calif. Curtie Bay, Md. Painewille, Obio.	2,000,000 10,000,000 2,800,000 4,025,000 1,450,000 100,000 100,000 100,000 300,000	Calcium carbide Calcium carbide Ammonium bicarbonate. Mydrogen peroxide Hydrogen peroxide Potamium persulphate, bydrogen peroxide cliente control co	day cottonseed. Under construction. Initial capacity: 142,500 tens per year. Doubling capacity. Leased property. Nearing completion. Cortificate of necessity granted. Completing. Nearing completion. Under construction. I production. 3 million lb. per year. Certificate of necessity granted. Certificate of necessity granted.
OTHERS Air Reduction (National Carbide) Allied Chemicol & Dyo. (Bolvay) Amariana Metallie Chemicole Buffalo Electrochemical Buffalo Electrochemical C. P. Hall Cerium Metals Corning Glass Culligan Zeolite Dawnood Allinii Diamond Allinii Diamond Allinii	Lubbock, Tex. Calvert City, Ky. Syracuse, N. Y. Portland, Ore. Vancouver, Wash. Tonawanda, N. Y. Chicago, III. Niagara Falla, N. V. Danville, Ky. San Bernardino, Calif. Curtis Bay, Md. Painesville, Ohio. Pallos Tex.	2,000,000 10,000,000 2,800,000 4,925,000 1,450,000 100,000 100,000 110,000	Cottonseed oil	day cottonseed. Under construction. Initial capacity: 142,500 tens per year. Doubling capacity. Leased property. Nearing completion. Certificate of necessity granted. Completing. Nearing completion. Under construction. I production. 3 million lb. per year. Certificate of necessity granted. Certificate of necessity granted. Certificate of necessity granted.
OTHERS Air Reduction (National Carbide) Allied Chemical & Dyo. (Bolvay) Amariana Metallie Chemicale Buffalo Electrochemical Buffalo Electrochemical C. P. Hall Cerium Metals Corning Glass Culligan Zeolite Dawison Chemical Diamond Alltali Dow.	Lubbock, Tex. Calvert City, Ky. Syracuse, N. Y. Portland, Ore. Vancouver, Wash. Tonawanda, N. Y. Chicago, Ill. Niagara Falls, N. V. Danville, Ky. San Bernardino, Cailf. Curtie Bay, Md. Painesville, Ohio. Dallae, Tex. Freeport, Tex. Ludinston, Mich.	2,000,000 10,000,000 2,800,000 4,025,000 1,450,000 100,000 100,000 100,000 100,000 750,000	Cottonseed oil	day cottonseed. Under construction. Initial capacity: 142,500 tons per year. Doubling capacity. Lessed property. Nearing completion. Cortificate of necessity granted. Completing. Nearing completion. Under construction. In production. 3 million lb. per year. Certificate of necessity granted.
OTHERS Air Raduction (National Carbide) Alliad Chemicala (Pro. (Solvay) Amariana Metallia Chemicala Buffalo Electrochemical Buffalo Electrochemical Corium Metals Corrium Metals Corrium Metals Corrium Metals Corrium Metals Davinco Chemical Davinco Chemical Diamond Alliali Diamond Alliali Dow Dow Dow Dow Dow Dow Dow Dow	Lubbock, Tex. Calvert City, Ky. Syracuse, N. Y. Portland, Orc. Vancouver, Wash. Tonawanda, N. Y. Chicago, Ill. Niagara Falle, N. Y. Danville, Ky. San Bernardino, Calif. Curtie Bay, Md. Painesville, Obio. Dallae, Tex. Freeport, Tex. Ludington, Mich. Martinebure, W. Y.	2,000,000 10,000,000 2,800,000 4,025,000 1,450,000 2,000,000 100,000 110,000 100,000 750,000 1,400,000	Cottonseed oil	day cottonseed. Under construction. Initial capacity: 142,500 tens per year. Doubling capacity. Leased property. Mearing completion. Cortificate of necessity granted. Completing. Under construction. In production. 3 million 1b. per year. Certificate of necessity granted. Certificate of necessity granted. Proposed. Certificate of necessity granted. Certificate and necessity granted.
OTHERS Air Radizeliolii. (National Carbide) Alliad Chemicola & Dyo. (Bolvay) Amariana Metallic Chemicola Buffalo Electrochemicol. Buffalo Electrochemicol. C. P. Hall. Corium Metals. Corning Glass Culligan Zeolite. Diamond Alliali. Diamond Alliali. Dow. Du Pons. Du Pons.	Lubbock, Tex. Calvert City, Ky. Syracuse, N. Y. Portland, Orc. Vancouver, Wash. Tonawanda, N. Y. Chicago, Ill. Niagara Falle, N. Y. Danville, Ky. San Bernardino, Calif. Curtie Bay, Md. Painesville, Obio. Dallae, Tex. Freeport, Tex. Ludington, Mich. Martinebure, W. Y.	2,000,000 10,000,000 2,800,000 4,025,000 1,450,000 100,000 100,000 100,000 100,000 750,000	Cottonseed oil	day cottonseed. Under construction. Initial capacity: 142,500 tons per year. Doubling capacity. Lessed property. Nearing completion. Certificate of necessity granted. Completing. Nearing completion. Under construction. In production. 3 million lb. per year. Certificate of necessity granted. Contract awarded. Underway.
OTHERS Air Raduction (National Carbide) Alliad Chemicala Dyne. (Solvay) Amariana Metallia Chemicala. Buffalo Electrochemical. Buffalo Electrochemical. Corium Metals. Corrium Metals. Corrium Metals. Corrium Metals. Dawisco Chemical Diamond Alliali Diamond Alliali Dow. Dow. Dow.	Lubbock, Tex. Calvert City, Kr. Syracuse, N. Y. Portland, Ore. Vancouver, Wash. Tonawanda, N. Y. Chicago, Ill. Niagara Falls, N. Y. Dasville, Ky. San Bernardino, Calif. Curtie Bay, Md. Painesville, Obio Dallas, Tex. Freeport, Tex. Ludington, Mich Martinsburg, W. Ya. Memphia, Tenn.	2,000,000 10,000,000 2,800,000 4,025,000 1,450,000 2,000,000 100,000 110,000 100,000 750,000 1,400,000	Cottonseed oil	day cottonseed. Under construction. Initial capacity: 142,500 tons per year. Doubling capacity. Lessed property. Nearing completion. Cortificate of necessity granted. Completing. Nearing completion. Under construction. In production. 3 million lb. per year. Certificate of necessity granted. Contract awarded. Under construction. Under construction. Under construction. Under construction.
OTHERS Air Raduction (National Carbide) Alliad Chemicola (Popularia) Alliad Chemicola (Popularia) Buffalo Electrochemicola Buffalo Electrochemicola Buffalo Electrochemicola Corning Glass Corning Glass Corning Glass Corning Glass Corning Glass Davison Chemicol Diamond Alliali Diamond Alliali Diamond Alliali Dow	Lubbock, Tex. Calvert City, Ky. Syracuse, N. Y. Portland, Orc. Vancouver, Wash. Tonawanda, N. Y. Chicago, Ill. Niagara Falle, N. Y. Danville, Ky. San Bernardino, Calif. Curtie Bay, Md. Painesville, Obio. Dallae, Tex. Freeport, Tex. Ludington, Mich. Martinebure, W. Y.	2,000,000 10,000,000 2,500,000 4,025,000 1,450,000 100,000 110,000 750,000 1,460,000 1,460,000 1,500,000	Cottonseed oil	day cottonseed. Under construction. Initial capacity: 142,500 tons per year. Doubling capacity. Leased property. Mearing completion. Cortificate of necessity granted. Completing. Nearing completion. Under construction. In production. 3 million lb. per year. Certificate of necessity granted. Under construction.

FIRM	LOCATION	DOLLARS	PRODUCT(S)	JOB STATUS AND REMARKS
Others (cont.)				
Harshaw	Elyria, Ohie	300,000	Chrome alumina catalyst Antimony oxide Glycerine	Certificate of necessity granted. Underway. Flame retardant. Certificate of necessity granted.
International Minerals & Chemical	San Jose, Calif	3,000,000	Monosodium glutamate.	Expanding.
Kaweeki Chemical	Boyertown, Pa		Titanium double	Certificate of mossesity granted.
Libbey-Owens-Ford Liberty Powder	Romford, Ohio		Precision plate glass	Proposed. Will operate re-activated Badger Ordnance Works.
Molybdenum Corp. of America Molybdenum Corp. of America	Washington, Pn		Molybdenum oxide Ammonium paratungstate	Certificate of necessity granted. Certificate of necessity granted.
Momento	Seattle, Wash		Vanillin	Under construction. From lignin. Certificate of necessity granted.
Pacific Carbide & Alloys. Pennsalt. Philadelphia Quarts	Portland, Ore	349,000	Calcium carbide	Expanded to 1,200 tons per month. Increasing capacity. Certificate of accessity granted.
Pittsburgh Plate Glass	Crystal City, Mo		Glass	Expanding capacity.
Quaker Oata	Omaha, Neb. Richmond, Calif. Louisville, Ky.	150,000	Furfural Ferrie sulphate Hydrochlorie acid	In production. 40 million lb. per year. Certificate of necessity granted. Planned. For neoprene.
Titanium Alloy	Baltimore, Md	400,000	Zirconium silicate Ethyl alcohol	In tonnage production. Commetin grade. Certificate of accessity granted. Underway. For decontamination purposes.
U. S. Rubber (Govt. contract)	Natrium, W. Va Kankakee, Ill	3.000,000	Supertropical bleach High explosives	Signed contract to reactivate Kankakee Ord. Wks.
Union Carbide(Govt. contract)	Ashtabula, Ohio		Calcium earbide	Leased to Carbide. 70,000 tone per year.
Union Carbide	Portland, Ore		Calcium earbide and ferro-alloys	Will double output.
Union Carbide	Ashtabula, Ohio	107000	Calcium carbide	Doubling capacity to 300,000 tons per year.
Union Carbide (Electro-Metallurgical)	Niagara Falls, N. Y.		Calcium carbide	In production. Last of 4 furnaces.
Union Carbide	Bishop, Calif	500,000	Calcium tungstate	Certificate of necessity granted.
Western Electrochemical	Henderson, Nev	5,000,000	Chlorates and perchlo- rates, manganese dioxide	Expanding.

New Processes and Technology, 1950-51

Below is a listing of 190 new or newsworthy developments in processes and technology that were introduced or commercialized during 1950-51.

FATS AND			LOCATION	PEATURES	STATUS AND REMARKS
C-111-D	OILS				
CORTORNING OU	Pro-expelling	Delta Products Co.	Wilson, Ark.	Special expeller removes part of eil, rest is solv, extracted.	Developed by V. D. Anderson Co. In plant use.
Cottonseed oil	Solvent extraction	_		Isopropanol extracts oil from meats. Extract is refined by extraction with bexane.	Developed by Texas Eng. Exp. Sta. Offered commercially May 1981.
Fats and oil	Extraction	Swift & Co.	Hammond, Ind.	Liquid propane extraction at 465psi. and 175 deg. F. removes color, me- tallic scape, oxidized fats.	In use. Swift will lisense others.
Fatty acrds	Fractions erystal- lisation	Armour & Co.	Chicago, Ill.		Developed by Texase Development Corp. Plant completed late 1950.
Fatty acids	Distillation				Developed by Fester Wheeler Corp.
Glycerides	Hydrolysis	_		Hydrolysis of soybean oil with water at 500 pei, and 240 deg. C. separates glycerine and fatty acids. Re-com- bination produces mono-glycerides.	Developed by U. S. Dept. of Agri- culture. Cost claimed competitive with conventional process.
Soybean oil	Solvent extraction	Various	-	Rotary extractor divided into 18 sectors. Needs less headroom than basket extractors.	"Rotocel" extractor used, developed by Blaw-Knox Co.
Vegetable oils	Miscella clarification	Various		Water injection permits removal of olineed fines from miscella in cen- trifumls.	Developed by Blaw-Knox Co. Two plants announced Nov. 1950.
Vegetable oils	Solvent extraction			Extractor consists of chain conveyor in a looped tube.	Developed by Iowa Engineering Exp. Sta. Demonstrated in 15T/day plant.
TEXTILE FI	BERS				
Aerilaa	Polymerisation	Chemetrand Corp.	Decatur, Ala.	Hydrolysis improves dysing. Besed on acrylonitrile.	Plans for plant announced Jan. 1951 by Chemstrand Corp.
Aerilouitrile	Dysing of fibers	Curbide & Carbon Chemicals Div.	So. Charleston, W. Va.	Uses copper sulphate with a reducing	
Daeron	Polymerication	E. I. duPent de Nemours & Co.	Kinston, N. C.	Condensation product of dimethyl terephthalate and ethylene glycol.	Plans for plant announced Aug. 1951, by duPont. Liconsed from Calleo Printers Asso. Ltd.

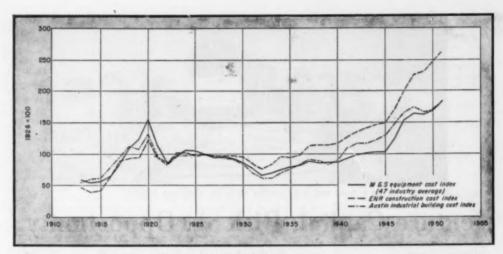
PRODUCT		OSER	LOCATION	PEATURES	STATUS AND REMARKS
Textile Fibers (Acrylonitrile-vinyl chloride polymer.	In rapidly expanding commercial
lynel		Carbide & Carbon Chemicals Div.	W. Va.		production. Owens-Corning Co. has produced
Glass fibers	Dyeing of fibers	Various		Fibers retain fire resistance.	dyed fibers for evaluation.
INORGANIC	:s				
Ammonium nitrato	Prilling	Spencer Chemical Co.		stream gives better uniformity of	Process in use.
Ammonium sulphate	Waste recovery	General Petroleum Corp.	Terrance, Calif.	particles. Uses ammonia-containing cracking sas, plus sludge acid, both wastes.	
Ammonium sulphate	Double decompo- sition	Gov't. of India	Sindri, India	Ammonia from enal plus CO2 and gypeum make 1,000 T/day of sul-	ICI process, built by Chemical Con- struction Corp.
Ammonium sulphate	Double decompo-	Phillips Chemical Corp.	Houston, Tex.	phate. If used, process will use synthetic ammonia and byproduct gypeum	Under consideration
Ammonium sulphate	Spray			Spray sulphurie acid and liquid cool- ant into gaseous ammonia to get dry	Developed by Secony Vacuum Oil Co.
	Wiene Ivens	Tennemee Valley	Wilson Dam, Ala.	product. Improved furnace treats phosphate	Demonstration 115 T/day furnace
Calcium metaphosphate Chlorine	Fines-lump process HCl recovery	Authority Hercules Powder Co.	Brunswick, Ga.	fines as well as lumps with PrOs. Treatment of ferric oxide with HCL. followed by catalytic oxidation to re-	In operation. Announced late in 1951. Licensed from Dox
Chlorine	DeNora mercury	Marathon Paper Mills of Canada	Marathon, Ont.	lease Cla. Uses DeNora cell for 25 tons Cl ₂ /dav. Built by Leonard Construction Co.;	First commercial DeNora plant in North America
Chlorine	Nitrosyl chloride modification	Salvay Process Div.	Hopewell, Va.	30,000 amp. cells. Geta more Cl ₂ from present salt- nitrie process by oxidising byproduct NOCI to release Cl ₂ , regenerate	Proposed
Chlorine	Electrolytic from			HNOs. From HCl via electrolysis of CuCls	Developed by Westvaco Div. 12 T/day plant has been designed.
Cracking catalyst.	HCI Slag process	Bay Chemical Co.	Weeks, La.	in 4,000 amp. cell. From steel mill slag by HCl treat-	Plant construction announced early
microspheroidal Cracking catalyst. microspheroidal	Spray-dry		Cincinnati, Ohio	ment to adjust alumina-eilica ratio. Made from sod. silicate, alum. sul- phate, acid and ammonia. Reduces	in 1951. New plant operating early 1951
Fertiliser, mixed	Granulation	Davison Chemical	Baltimore, Md	process time greatly. Granulation process reduces caking	Developed by Sturtevant Mill Co- early 1950.
Heavy water	Distillation	Corp., and others Atomic Energy Comm.		in storage. Low-temperature hydrogen distilla- tion process makes cheaper heavy	Cost of project was estimated as \$ million in 1950.
Hydrogen eyanide	Coke gas recovery	Koppers Co	Kearny, N. J	water. Hist and HCN absorbed from coke	Plant operating, licensee available
Hydrogen peroxide		E. L. duPont de	Memphis, Tenn	to acid, HCN purified. New process based on 6 yr. research.	Plant to be ready before end of 1985
Mica, synthetic	Electric furnace	Nemours & Cu		High-temp. electric furnace process from quarts magnesite, etc. Claimed	Developed by U.S. Bureau of Mine
Nitrie neld	Bamag-Meguin	_	-	Oxidizes NHs with Os to produce on one acid without dehydration	Variation of Fauser process deve in Germany. Is offered by Gen
Nitrie seid	Thermal fixation	Army Ordnance	Sunflower plant, Lawrence, Kan	by HsO4. High-temp. Food Machy-Wisconsin process fixes N: as NO: at 4,200	First such plant to be hull to nounced mid 1952.
Ozone (tonnage)	_		-	deg. F., + H ₂ O → HNO ₁ . Dependable continuous process using air or O ₂ .	announced rail troo.
Pickle liquor	Evaporation			Uses submerged combustion and sintering of separated FeSOs	by Chemical Const. Corp.
Phosphoric acid	Evaporation	Gates Bros - Inc	Wendell, Idaho	First submerged combustion for con- centrating H ₂ PO ₆ , 90% fuel effy, in	tion Corp., built by Chate
l'hasphorus	Electric furnace	Tenesee Valley	Wilson Dam, Ala.	Rotating crucible electric furnace gives smoother operation, less wear	
Plutonium	Process Reactor	Authority North American	Downey, Calif.	Low-power reactor designed for in- dustrial and institutional use	
Falt	Evaporation	Aviation Autonio Zoghbi	Carnens Venezue	a Package plants for 10-100 T/0a) using single-effect vapor recompres	Developed by Manistee Iron Works Several more on order
Sodium dispersions	Dispersion	Various		Sion evaporator. Dispersed in inert liquids by specia	
Sodium hypothlori	te Electrolysis	Various fisheries		colloid mill. Makes cod. hypochlorite colns. fo	Developed by Frank Negro hatell
Sulphur	Flotation	Wyoming Gulf Sulphur Co	Cady, Wyo	fisheries by electrolysis of seawater Concentration of low-grade sulphu ores makes about a 90% product a	r 35 T/day plant started into 1951
Sulphur	Agglomeration	Indus. Purace. S. A.	Colombia, S. A.	agglomerated in hot water, pare	 Developed by Chemical Constr- is tion Corp. Plant to operate in 1952.
Sulphur	Pyrites distillation	Noranda Mines Ltd.	Hamilton, Ont.	Half of sulphur in pyrites can be dis tilled off on travelling grate; rest t	Plant under consideration
Sulphur dioxide	Fluidized roasting	Brown Co., and others	Berlin, N. H	Pyrites or pyrrhotite fines of 10-1- mesh burned in fluidised bed to giv	6 Developed by Dorr Co. Nearly re units on order throughout world
Sulphur dioxide	Compression	Canadian Indus	- Copper Cliff, On	high strength 30s. 70% 80s from Os smelting of Ni ca	n Construction started late 1952
Sulphurie seid	Simplified contact	American Cyan		be liquefied by compression. Simplified contact process for 93° acid saves cooling water, plant cos	
Superphosphate	Nitrie acidulation		y Wilson Dam, Ale	Saves HaSOs by using HNOs, NI	It TVA to build 50,000 T/yr. plant
Tritium	(several variation	Atomic Energy Comm.	Savannah R., S.		or DuPont is building for AEC.

				PROCE:	SSES & TECHNOLOGY
PRODUCT	PROCESS	USER	LOCATION	PEATURES	STATUS AND REMARKS
Inorganics (cor	M.)				
Uranium		Various		Uranium to be extracted from phos- phate rock via wet process phos- phoric acid for cone, super.	Blockson. Int. Minerals & Chem. Virginia-Carolina and others to have plants.
Water treatment	Silicate	-		Purifies water with Cla and sod. sili- cate; faster, less Cla.	Developed by Philadelphia Quarti Co.
Zirconium refrac- tories stabilized	Lame stabilization	Norton Co.	Worcester, Mass.	Zirconia stabilised with lime in electric furnace makes 4,700 deg. F. refractory.	Now in relatively large scale production.
METALS					
Chromic acid	Recovery	Various		Direct evaporation from plating bath	Developed by Pfaudier Co. Five
Chromium	Electrolytic	Electromet Div.,	Sault Ste. Marie.	rinse. Eliminates pollution. Higher purity metal.	units installed; more planned. Developed by U. S. Bureau of Mines
Chromium	Recovery	Union Carbide	Mich.	Eliminates pollution. Uses ion ex-	Scheduled for plant in 1951. Developed by Mutual Chemical Co.
Colinit	Refining	Howe Sound Co. and St. Louis Smelting &	Gartield, Utah Fredricktown, Mo.	change on anodizing baths. Frees U. S. of import dependency.	of America. Developed by Chemical Construc- tion Corp. Two commercial plants underway.
Hafneum	Hot filament	Refining Co. Atomic Energy	Oak Ridge, Tenn	Tetrachloride process, gives 99%	Developed by Foote Mineral Co. In
Iron, pig. and tita-	Ilmenite smelting	Comm. Various	Sorel, Que.	hafnium. Electric smelting of ilmenite, slag	commercial operation. 1,800 T/day plant under way in
nium slag Iron	Phosphoric acid	Caterpillar Trac-	Peoria, Ill.	equals 70% TiO ₂ . Sulphonated cross-linked polysty- rene ion exchange resins remove Fe.	1950. Developed by Permutit Co. In com- mercial use.
Manganese	Recovery			Leaches with waste ferrous sulphate to recover Mg from low-grade ores.	Developed by Mellon Institute. In laboratory.
Titanium.	Electrolytic	Horizons Titanium Corp.	Cleveland, Ohio	\$1/lb. Ti is elaimed.	Pilot plant.
Titanium	Electrolytic	-	-	\$2/lb. TL is elaimed	Research at Columbia Univ. by Arthur Kerbecek.
Fitanium	Mg reduction	Titanium Metals Corp.	Henderson, Nev.	World's first self-contained plant. Uses electrolytic Mg.	In commercial operation Oct. 1951.
Liteonium	Mg reduction	U. S. Bureau of Mines	Albany, Ore.	Duetile Zr. 7.000 lb. a month.	Developed by Bureau of Mines. Demonstration plant.
NATURAL	GAS				
Acetylene	Partial oxidation	Carbide & Carbon Chemicals Div.	Texas City, Tex.	Natural gas partially oxidized with 95% O ₂ at 2,700 deg. F. Purified by water scrubbing.	Plans announced May 1951 for large semi-commercial plant. Based on Sachse process.
Acetylene	Partial oxidation			Uses unspecified solvent purification.	Modified Sachse process developed by Badische, lie. by Chemico.
Acetylene	Partial oxidation	Monsanto Chemical Co.	Texas City, Tex.	Partial exidation of natural gas. Purification by absorption.	Plant under construction. Believed based in Sachse process.
Acetylene	Thermal cracking	Wulff Process Co.	Los. Angeles, Cal	Cracks natural gas at 2,600 deg. F. in regenerative furnace.	Commercial unit ready to start as of Feb. 1981.
Chemicals	Various	National Petro- Chemical	Tuscola, Iil.	Will produce LP-G and chemicals from pipeline gas including ethane, ethyl alcohol, ethyl chloride.	\$32 million plant for natural gas chemicals announced Jan. 1952.
Ethylene	Adsorption storage	_	_	Would permit ethylene transport via	Developed by J. F. Pritchard Co.
Ethylene	Autothermic cracking		-	Heat of reaction for cracking ethane	Developed by UOP. Demonstrated
Fuel gas	Reforming	Rochester Gas & Electric Corp.	Rochester, N. Y.	provided by introducing air or Os. Reforms natural gas to 300 Btu. gas or liquid hydrocarbons to 1,000 Btu.	in pilot plant. Plant for 1 million eu. ft./day started up in Sept. 1951, using Keppers-
Natural gae	Adsorption storage	-		1 eu. ft. clay will retain 300 SCF. of methane.	Hasche regenerative furnace. Pilot plant announced by Floridin
Synthesis gas	Catalytic reforming	Various	Various	Uses 28 ft. long reactor tubes of SiC. Operates up to 2,700 deg. F. to re- form natural gas or liquid HC's.	Co. in Oct. 1950. Developed by Gas Machinery Co. Plans announced in April 1951 for two commercial units.
FINE ORGA	NICS				
Aerylie acid, glacial	Pyrolysis	B. F. Goodrich	Avon Lake, Ohio	Produced by pyrolysis of beta pro-	First commercial production ans.
Acrylates		Chemical Co. Carbide & Carbon	So. Charleston.	piolactone polymer. Start with pure olefin hydrocarbons.	Oct. 1950. Small commercial plant announced
Alcohol, high	Oxyl synthesis	Chemicals Div.	W. Va.	Low cost C: to C:s alcohols of high	in 1950. Process offered by Blaw-Knox Co.
mol. wt. Allethrin (synthetic pyrethrum)	Synthetic	Carbide & Carbon Chemicals Div.	So. Charleston, W. Va.	purity from syn. gas. 12-step synthesis from ethyl aceto- acetate, allyl chloride, methallyl	First commercial production, de veloped U. S. Dept. of Agriculture
Antibiotics	Automatic	Commercial Sol-	Terre Haute, Ind.	chloride, glycine, etc. Fully automatic process for peni-	First automatic process for anti-
Arabogalactan (wood gum)	Solvent extraction	vents Corp.		cillin, bacytracin, etc. Water soluble gum like gum arabic from waste larch wood by solvent	biotics. Developed by Western Pine Association.
a-Butyrie acid	Oxo	Tennessee East-	Longview, Tex.	Frem propylene via butyraldehyde	In pilot plant—full scale plans an
Ditric seid	Deep fermentation	man Corp. Stauffer Chemical	Callender, Calif.	by Oxe reaction and oxidation. Accelerated fermentation based on	nounced June 1950. Announced Oct. 1951.
litric acid	Deep fermentation	Co. Summer Chemical	Elkhart, Ind.	beet sugar molasses. Air bubbled through deep sugar fer-	New plant was under construction
Cortisone Cortisone Fatty alcohols	Synthetic Synthetic Hydrogenation	Co. Syntex. Inc. Merek & Co. Proctor & Gamble	Mexico City Rahway, N. J. Long Beach, Calif.	mentation medium. From yams via 22-step synthesis. From plentiful steroids.	Oct. 1950. Plant being built in July 1951. Synthesis in laboratory stage. First DeNora process plant in U. S In operation.
Pluoromarbone	Electrolytic	Minnesota Mining & Mig. Co.	Hastings. Minn.	Electrolytic process makes Sucro- carbons using anhydrons HF.	Commercial production started late 1951. Developed at Univ. Fla. (Fine Organica, cost.

PRODUCT	PROCESS	USER	LOCATION	FEATURES	STATUS AND REMARKS
Place organics (s Inceita)		Stelan Mr. O.	Danston III	From some observe W	Comments about
Levuloso	Prempitation Hydrolysis	Staley Mfg. Co.	Decatur, Ill.	From oorn steep liquor by precipita- tion and hydrolysis of crude phytate. From beet sugar by hydrolysis and	Commercial plant announced Jul 1981. Pilot plant at University of Colorade
Methionine	Synthesis	Dow Chemical Co.	Pittaburg, Calif.	lime separation. 8-to-1 cost reduc- tion. From acrolein, methyl mercaptan,	First commercial plant, started earl
Montan war	Bleaching	American Lignite	Ione, Calif.	codium cyanide, etc., by four-step process. Chromate exidation bleaching pro-	1950. Commercial operation was expecte
Niaoin	Bynthetie	Products Co. Merek & Co.	Rahway, N. J.	oess. New process uses NHs and formalde-	mid 1951. To be in operation seen. Member of
Maginamide	Synthetic	Nepera Chemical	Harriman, N. Y.	hyde, rather than searce pyridine. From acctaldehyde and NH ₂ via	B vitamin family. In operation.
Nylon salt		Co. E. I. duPont de	Victoria, Tex.	methyl ethyl pyridine. New process for nylon salt.	Announced mid 1950.
Polyvinyi pyrrolidene (PVP plasma subst.)	Ethynylation	Nessours & Co. General Asilino & Film Curp.	Grasselli, N. J.	From acetylene and formaklehyde by high pressure condensation, hy-	In volume production, early 1951.
Protein	Photosynthesis	Several companies		drogenation and ammonolysis. Gives 130 times as much protein and	
Pyridines	Synthetic	considering Carbide & Carbon Chemicals Div.	Institute, W. Va.	fat per acre as coybeans. From acetaldehyde and ammonia.	Research Institute. To build plant, operation in 1982.
Pyridines	Synthetic	Phillips Chemical Co.	Houston, Tex.	From acetaldehyde and ammonia.	\$3 million plant to be in operation i
Sodium cellulose sulphate (sol. gum)		Tonnessee Eastman Corp.		Cellulose and H ₂ 8O ₄ ; neutralised with NaOH.	Accounted fall 1989.
1-Sorbose	Aerobio fermenta- tien	Hoffman-LaRoshe, Inc.	Nutley, N. J.	Ex d-sorbitol via submerged culture aerobic fermention.	Process in use since early 1950.
Terramyoin	Fermentation	Chas. Pfisor & Co.	Brooklyn, N. Y.	Fermentation followed by precipita- tion with quaternary ammonium	Commercial operation since cart 1950.
Tetraethyl lead	Continuous	E. I. duPont de Nemours & Co.	Deepwater, N. J.	Increases output, eliminates need for	Plant for 50 million lb yr. at nounced early 1961.
Various	Mechanical activation	Carlinie Chemical Works	Reading, Ohio	sp. alloy equipment. Metal catalysts out in presence of reactants in Cimmae reactor for reduction, Grignard, etc.	Developed by Cerlisle and Cineir nati Milling Machine Co. Available meram't, sizes.
Vinyl compounds	Reppe synthesis	General Aniline & Film Corp.	Gramelli, N. J.	Via high pressure acetylenereactions with alcohole.	Still in development. Over \$9 millie spent on research.
Vitamin A	Synthetic	Hoffman-LaRoche, Inc. and others	Nutley, N. J.	12-step process starting with citral.	In commercial use since early 1950.
Vitamin A (orystal)	Gelatine coating	Chas. Pfiner & Co.	Groton, Coan.	Enables Vitamin A to be used as dry crystals by gelatine coating process.	\$2 million plant in use since cor 1951.
Wax, sugar came	Solvent extraction	Colonial Sugare Co.	Gramercy, La.	Cane press cake is solvent extracted with hot acctone.	Developed by Cuban America Sugar Co. and S. C. Johnson & Soi Inc., in Cuba.
HEAVY OR	BANICS				
Acrylonitriis	Direct	Monsanto Chemical Co.	Texas City, Tex.	Based on acetylene.	Plans announced Oct. 1950, \$3
Carbon bisulphide	Catalyvie	Barium Reduction Corp.	So. Charleston, W. Va.	Natural gas and sulphur vapor react at 500-600 deg. F. over silica gal.	million plant. Developed by Pure Oil Co. 1 operation.
Ceal chemicals	Hydrog-nolysis	Carbide & Carbon Chemicals Div.	Institute, W. Va.	High-pressure hydrogenolysis de- polymerises coal to produce phonois, arylamines, quinolines, etc.	Large-scale process studies under way.
Coal products	Low-temperature earbonization	Pittsburgh Cossol- idation Coal Co.	Library, Pa.	Char makes good boiler fuel. Tar- can be refined to creosotes, electrode	Plans announced in Dec. 1951 for large pilot plant.
Coal tar	Vacuum di-tillation	Various		Vacuum in second stage of 2-stage continuous tar distillation. Higher yields of anthrassme, reduced crack-	European installations of $180-40$ T/day.
p-Cressil	Para-tymone oxida-	Herenios Powder	Wilmington, Del.	ing, less corrosion. Para-cymene oxidised, split to acc-	Pilot plant announced in Oct. 1950
-Crossi	Tolune hydrolysia	Co. Hydrocarbon	Newark, N. J.	tone and para-cresol. Toluene vapore bubbled through	Plane announced in June 1951 fo
DDT	Continuous	Chemicals, Inc. Dominion Rubber	Montreal, Que.	H ₂ SO ₄ and boron catalyst. Uses fluorulphonic acid instead of H ₂ SO ₄ for dahydrating. Yields,	10,000 lb./day. Successful pilot plant operation.
Ethyl alcohol	Fermentation	Grain Processing Corp.	Muscatine, Iowa	capacity increased. Fungal amylass replaces barley malt in converting starch to sugars.	culture. Experimental commercia
Ethyleus glycol	Ethylene oxida- tion(?)	Hastcock Chem-	Long Beach, Calif.	Belgian process developed by Société Carbochemique.	operation. Building started Dec. 1951. \$4 million plant also to produce ethanols
Ethylene glycol	Ethylene oxidation	Société Naphta- chemie	L'Etang de Berre, France	Ethylene is oxidized with air, using Ag catalyst.	Developed by Scientific Design Co Plans announced in June 1951 fo 8,000 T/yr. plant.
Fuels, synthetic	Coal hydrogenation	Bureau of Mines	Bruceton, Pa.	Process improvements: First step at 1,500 psi, rather than 4,000-10,000 psi. Impreg. of coal with catalyst re-	Demonstration plant.
Fuels, synthetic	Pincher-Tropash	South African Coal, Oil & Gas	Johannesburg, So. Africa	duces contact time. Oil from soal using modified catalyst and completely redesigned reactor;	Engineered by M. W. Kellogg Co
Perel gas	Coal gasification	Alabama Power Co. and Bureau of Mines	Gorgas, Ala.	higher yield. Underground gasification of coal produces fuel gas of 120–180 Btu./ou.ft-Process demonstrated by Sinelair Coal and Missouri School of Mines,	plant in April 198E. Experimental work. Tests planse using electric heaters in bore hole to eliminate need for drilling al passages.
Slyowiae	Purification	Various	_	at Hume, Mo. Ion exchange purifice crude glycorine, sliminates distillation.	Developed by Illinois Water Treat ment Co. Process in use by severa
Lignite char	Low-temperature carbonisation	Texas Light & & & Power Co.	Rockdale, Tex.	Lignite carbonised in fluidized bed at 950 deg.F. Char power plant fuel is competitive with other fuels.	producers. Plans announced mid 1951 for plan handling 7,000 T/day lignite for power for Alexa Al plant.

PRODUCT	PROCESS	USER	LOCATION	PEATURES	STATUS AND REMARKS
Heavy Organics		P	Charles I Chi	Continues and the set	Started operation in Aug. 1881
Napalm	Continuous	Ferro Chemical Corp.	Cleveland, Ohio	Continuous process with automatic proportioning and metering equipment.	\$300,000 plant produce 1 million lb./mo.
Phenol	Cumene oxidation	Various	_	Cumens oxidized, splits to phenol and acctone. Needs no sulphur or shloring.	
Phthalie anhydride	Phenanthrene oxidation	_		Oxidation of phenanthrene with Na-V ₂ O ₂ catalyst in fluidized bad.	Developed by British Coal Utiliza- tion Research Assn. In laboratory stage.
Plastic faminates	Bonding to glam	Various		Vinyl chlorosilane and methaerylate chromic chloride improve bond between polyester resin and glass	In use.
Sugar, cane	Defecation	Various	Various	filters. New defreant precipitates impurities as fast filtering cake. Composition	Developed by Eigenaite Corp. In use at several sugar refineries.
Sugar waste	Solids removal	Various	Various	not disclosed. Waste water is treated with chlorine and lime, solids allowed to coagulate	
Urea	Oil slurry recycle			and settle. Solid carbamate is recycled as siurry	Developed by Pechiney in France
Urea	Once-through	Solvay Div., Allied Chemical	South Point, Ohio	in mineral oil. Unconverted carbamate dissociates and is vented from process.	Offered by Foster Wheeler. Plant in operation.
Water gas	Fluidized bed	& Dye Corp.		Steam introduced below fluidised	In pilot plant as of May 1951 by
Water gas	Continuous	E. I. daPont de Nemours & Co.	Belle, W. Va.	bed of waste coal. Mixed oxygen and steam over coke eliminates alternating operation.	British Fuel Research Station. Plant in operation, using 260T/day oxygen unit.
PETROLEUM					
Aromatica	Selective adsorption	San Off Co.	Mareus Hook, Pa.	Arematice in Houdriformer product adsorbed on cilica gel, selectively desorbed with mixed xylence, butane.	for 13 million gal./yr. benzene, 30
Aromatics	Catalytic reforming	Various		Reforming process using Pt catalyst makes aromatics using modified	Developed by UOP, in wide use for octane improvement. "Platform-
Aromatice	Solvent extraction	Various	Various	charge stock. Aromatics extracted from hydro- carbons with disthylene glycol.	ing." Two units planned as of Sept. 1951. Developed by Dow and UOP. Uden
Asphalt	Catalytic blowing	Lion Oil Co.	El Dorado, Ark.	High recovery. 0.5-3.0 percent PsOs added when	Process in use.
Bensene	Catalytic reforming		-	blowing with air. Chromia-alumina catalyst, starts with n-bexame, not methyl cyclo-	Developed by Univ. of Kansas. In laboratory stage as of Dec. 1950.
Butadiene	-		-		Catalyst developed by Dow Chemi-
Direct fuel	Solvent extraction	Техае Со.	Eagle Point, N. J.	increases yields from 70 to 92 percent. Furfural extraction improves octane	eal Co. Process in use
Ethylene	Naphtha cracking	Imperial Chemical Industries	Wilton, Eng.	number, reduces 8. Pyrolysis at 1,700 deg. F. in presence of steam. Motor fuel and propylene	Construction under way by M. W. Kellogg Co., as of Aug. 1961.
Gasoline	Alkylation	Various	*****	Compartmented reactor gets better	Developed by M. W. Kelings Co.
Gasoline, oracked	Stabilizing			yields, uses less H ₂ SO ₄ . NaOH wash before exposure to air increases stability.	Developed by Standard Oil Develop- ment Co. "Sodafining."
Gregoes	Continuous	Emo Standard Oil Co.	Baltimore, Md.	Continuous process for limebase greases, increases capacity four-fold	Plant in operation.
Parafia wax	Continuous molding	Magnolia Petroleum Co.	Beaumont, Tex.	over batch. Uses modified chocolate molding machine. Cleaner, less labor, auto-	Process in use on plant scale.
Parafile wax	Continuous extrusion	Texas Co.	Port Arthur, Tex.	matic packaging. Wax is continuously extruded in ribbon form and cut to length. Reduces labor.	Operation of 06 T/day plant announced in Sept. 1951.
Petroleum	Recovery from oil minds	Government of Alberta, Canada	Alta.	Sands mixed with hot water, agitated with air to separate oil. Oil is then williams.	Demonstration plant by Alberta Govt. Largest single oil reserve(?)
Petroleum produets	Catalytic cracking	British-American Oil Co.	Edmonton, Alta.	Reactor and resenerator are in single	First unit recently installed. Ortho- flow process. (M. W. Kellogg Co.).
	Catalytic cracking		*	tower. Cheaper. "Package" unit for easil refiners uses TCC air-lift and standard oil- field derrick as supporting structure.	Developed by Socony-Vacuum Oi Co. and Southwestern Engineering Co.
Petroleum producta	Catalytic cracking	Various	Various	TCC process with air-lift system rather than bucket elevators. Harder catalyst.	Developed by Secony-Vacuum Oil Co. 20 units planned as of Feb. 1951.
Petroleum products	Catalytic reforming	Atlantic Refining Co.	Philadelphia, Pa.	Uses silica clumina catalyst, impregnated with Pt or Pd. High yields of aromatics.	Plans announced in Feb. 1051 for 11,000 bbl./day plant.
Petroleum producta	Catalytic reforming		_	Continuous entalytic reforming of low-octane maphthas. Catalyst is highly solective.	Advanced pilot plant stage. Developed by Houdry Process Corp. "Houdriforming."
Petroleum Products	Catalytic reforming	Various	Various	Reforms low-octane naphthas with fluid catalyst. Lower cost, higher yield than fixed bad.	Three planned July 1951. Developed by S O D Co., Std. Oli Ind. and Kellogg.
Petroleum products	Catalytic reforming	Secony-Vacuum Oil Co.	Augusta, Kan.	Uses chromia-alumina catalyst in bead form with moving bed.	Final considered. Thermefor Catalytic Reforming,
Petroleum producta	Hydrodesulphuri- sation	Union Oil Co.	Wilmington, Calif.	Combines estalytic hydrogenation and desulphurisation of a distillate with 4.5 percent B and 700 deg. F.	Plane announced in June 1981 for a plant installation.
Petroloum	Vacuum	Phillips		E.P. Operates at 100-800 micross. Higher	Process in use on plant scale.
roducta	distillation	Petroleum Co.		yields of high quality cracking feed stock.	(Petreleum, cent.)

PRODUCT Petroleum (co	PROCESS nt.3	USER	LOCATION	PEATURES	STATUS AND REMARKS
Shale oil	Autocombustion	Bureau of Mines	Rifle, Colo.	Requires no outside fuel. Shale flows downward in retort against burning gas.	Plana announced in July 1951 fe large plant; 6 T/day pilot plan operated previously.
Spent NaOH	Mercaptan removal	Ashland Oil & Refining Co	Catlettsburg, Ky	Electrolytic O ₂ exidises mercaptans to disulphides, absorbed in naphths.	Developed by American Develop
PULP AND	PAPER				
Bleached pulp	H ₂ O ₂ cold steep	Various	×	Cold steep needs no post-neutraliza-	Developed and licensed by Buffal
Chemigroundwood	Mechano-chemical		-	tion; low in cost, high in efficiency. Uses hardwoods. Chemical sook of	Electrochemical Co. Developed by N. Y. State College of
pulp Discolving pulp	Modified sulphate	International Pulp & Paper Co.	Natchez, Miss.	logs before grinding. First plant for making dissolving pulp from hardwood.	Forestry. Three pilot plants. Plant operating January 1951; plan announced to double capacity, Ma
Dissolving pulp and	Kraft	-		Logs chipped without debarking;	1951. Developed by Univ. of Fia.; 3 T, da
kraft Hardboard pulp	All-board process	Oregon Lumber	Dee, Ore.	bark separates during process. Uses waste Douglas fir slabwood.	pilot plant planned fall 1951. Plant in commercial operation, Nov
Sulphite pulp	Ammonia pulping	Co. Crown Zellerbach	Lebanon, Ore	Wood cooked in ammonium bisul- phite. Eliminates waste disposal	1951. Commercial plant under construc- tion, Dec., 1951.
Sulphite pulp	Evaporation	Various		problem. Wastes from sulphite pulping con-	Developed by Kurt Resembled. For
Sulphite pulp	Ligain extraction	_		contrated in special nonfouling evaporator and burned Uses triethylene glycol; gives more	Wisconsin mills using; equipped by Gen'l. American. Developed by Univ. of Wash., ex- perimental use by Weyerhause
				pulp, lignin byproduct.	Timber Co.
RUBBER					
Reclaimed rubber	Continuous devul-	U. S. Rubber	Cheektowaga.	Ozido-plasticisation agents reduce	Plant in operation. Capacity 120.00
Synthetic rubber	Continuous	Reclaiming Co. B. F. Goodrich Chemical Co.	N. Y. Port Neches, Tex.	devulcanisation time. Ingredients are pumped continuously through 12 reactors in series at 41 deg. F.	lb./day. In operation.
Synthetic rubber	Styrene-less	Goodyear Tire & Rubber Co.	Akron, Ohio	Process similar to GR-S except that vinyl-toluene is used instead of styrene.	Experimental commercial production. Vinyl tolurne being made b Dow.
Synthetic rubber	Butadiene poly- merization	U. S. Rubber Co.	Borger, Tex.	Uses no styrens, cheaper than GR-8. Polymerised at 86 deg. F. Product is easy to work.	Developed by Phillips Petroleun Experimental production starte June 1950.
MISCELLAN	EOUS TECHNOL	OGY			
	IEOO3 IECHNOL	V41			
	EQUIPMENT	USER	LOCATION	FEATURES	STATUS AND REMARKS
OPERATION			LOCATION Cadiz, Ohio	Sturries piped at savings compared with rail transport for distances over	
OPERATION Coal transport	EQUIPMENT	USER		Slurries piped at eavings compared with rail transport for distances over 100 mi. High acde. conversion efficiency at low voltages by mechanical switch-	7,000 T/day coal line under coa struction, announced May 1931. Developed in U. S. by ITE Circui Breaker Co. Experimental use 1948
OPERATION Coal transport Conversion	EQUIPMENT Pipeline Mechanical contact	USER Hanna Coal Co.		Sturries piped at savings compared with rail transport for distances over 100 mi. High acds. conversion efficiency at low voltages by mechanical switch- ing rectifier. Gives water with less than 1 ppm. ionis solids by use of mixed anion	7,000 T/day coal line under coastruction, announced May 1951. Developed in U. S. by ITE Circui Breaker Co. Experimental use 1948 commercial use 1950-51.
OPERATION Coal transport Convenion	EQUIPMENT Pipeline Mechanical contact rectifiers Mixed bed	USER Hanna Coal Co. Various		Sturries piped at savings compared with rail transport for distances over 100 mi. High ac-de. conversion efficiency at low voltages by mechanical switch- ing rectifier. Gives water with less than 1 ppm.	7,000 T/day coal line under construction, announced May 1951. Developed in U. S. by ITE Circular Streaker Co. Experimental use 1944 commercial use 1950-51. In commercial use 1050-51. Two commercial units now in use after several years experimental desired after several years experimental desired and the commercial units now in use the several years experimental desired several years experimental desired and the several years experimental desired an
OPERATION Coal transport Convenion Delonization Downstering	EQUIPMENT Pipeline Mechanical contact rectifiers Mixed bed exchanger Roll press, floating	USER Hanna Coal Co. Various Various Consolidated	Cadiz, Ohio Wayagemack,	Sturries piped at savings compared with rail transport for distance over 100 mi. High acds. conversion efficiency at low voltagem by mechanical switching rectifier. Gives water with less than I ppm. ionise solids by use of mixed anion and cation resiss. For soft materials; does not plug. Known as Stacomiser. Self-charging. Uses dislectric properties of polyethyluse and other plas-	7,000 T/day coal line under construction, announced May 1631. Developed in U. 8. by TTE Circuit Breaker Co. Experimental use 1948 commercial use 1090-31. In commercial use 1090-31. Two commercial use, Developed by Rohm & Hase Chemical Co. Two commercial units now in us after several years experimental developments. Beveral such filters on market, developed by American Optical and
OPERATION Coal transport Conversion Delonization Dewakering Filtration	EQUIPMENT Pipeline Mechanical contact rectifiers Mixed bed exchanger Roll press, floating ring Elsetroetatically charged filter Asbustas-paper	USER Hanna Coal Co. Various Various Consolidated Paper Co.	Cadiz, Ohio Wayagemack,	Sturries piped at savings compared with rail transport for distance over 100 mi. High ac-de. conversion efficiency at low voltages by mechanical switching rectifier. Gives water with less than I ppm. ionic solids by use of mixed anion and eation resists. For soft materials; does not plug. Known as Stacomier. Self-charging. Uses dielectric proper-	7,000 T/day coal line under construction, announced May 1631. Developed in U. 8. by TTE Circuit Breaker Co. Experimental use 1948 commercial use 1000-51. In commercial use 1000-51. Two commercial uses Developed by Rohm & Hase Chemical Co. Two commercial units now in us after several years experimental developments. Beveral such filters on market. developed by American Optical anothers. Developed by A. D. Little for AEC
OPERATION Coal transport Conversion Delonization Dewakering Filtration	EQUIPMENT Pipeline Mechanical contact rectifiers Mixed bod exchanger Roll press, floating ring Elsetrostatically charged filter Asbosto-paper filter	USER Hanna Coal Co. Various Various Consolidated Paper Co. Various Various	Cadiz, Ohio Wayagemack,	Sturries piped at savings compared with rail transport for distances over 100 mi. High acds. conversion efficiency at low voltagem by mechanical switching rectifier. Gives water with less than 1 ppm. louis solids by use of mixed anion and eation resiss. For soft materials; does not plug. Known as Stacomiser. Self-charging. Uses dislectric properties of polyethyless and other plastics. Capillary type filter, 50 times effi-	7,000 T/day coal line under construction, announced May 1931. Developed in U. 8. by ITE Circuit Preaker Co. Experimental use 1948 commercial use 1908-51. In commercial use 1908 point of the commercial use 1969 follows & Hass Chemical Co. Two commercial units now in a safter several years experimental development. Several such filters on market, developed by American Optical anothers.
OPERATION Coal transport Conversion Delonization Dewakering Filtration Filtration	EQUIPMENT Pipeline Mechanical contact rectifiers Mized bod exchanger Roll press, floating ring ring Chapter of the rectifiers Asbestos-paper diter Catalytic combus-	USER Hanna Coal Co. Various Various Consolidated Paper Co. Various	Cadiz. Ohio Wayagemack. Ont.	Sturries piped at savings compared with rail transport for distance over 100 mi. High acds. conversion efficiency at low voltagem by mechanical switching rectifier. Gives water with less than 1 ppm. ionic colids by use of mized anion and cation resize. For soft materials: does not plug. Known as Stacomiser. Self-charging. Uses dislectric properties of polyethyless and other plastics. Capillary type filter, 50 times efficiency and 4 times life of sand filtera. Surse hydrocarbon fumes on catalons in the same selection of the same selection	7,000 T/day coal line under construction, announced May 1931. Developed in U. S. by ITE Circuit French Co. Experimental use 1942 commercial use 1950-51. In commercial use 1950-51. Two commercial units now in use after several years experimental developments. Beveral such filters on market, developed by American Optical an others. Developed by A. D. Little for AEC Made by Cambridge Corp. Experimental. Developed by Catalytic Combustion.
OPERATION Coal transport Conversion Delonization Dewakering Filtration Filtration Filtration Funne disposal	EQUIPMENT Pipeline Mechanical contact rectifiers Mixed bod exchanger Roll press, floating ring Electrostatically charged filter Asbesta-paper filter Glass fiber filter	USER Hanna Coal Co. Various Various Consolidated Paper Co. Various Various Atomic Energy Comm.	Cadiz. Ohio Wayagemack. Ont. Hanford, Wash.	Sturries piped at savings compared with rail transport for distance over 100 mi. High ac-de. conversion efficiency at low voltages by mechanical switching rectifier. Gives water with less than I ppm. ionic solids by use of mixed anion and eation resists. For soft materials: does not plug. Known as Esteemier. Self-charging. Uses dielectric properties of polyethylsus and other plastics. Filters minute dust particles. Capillary type filter, 50 times efficiency and 4 times life of sand filters.	7,000 T/day coal line under construction, announced May 1931. Developed in U. B. by ITE Circuit Breaker Co. Experimental use 1942 commercial use 1950-51. In commercial use 1950-51. Two commercial units now in use after several years experimental developments. Beveral such filters on market, developed by American Optical anothers. Developed by A. D. Little for AEC Made by Cambridge Corp. Experimental. Developed by Catalytic Combustic Corp. (Ruff process).
OPERATION Coal transport Conversion Delonization Dewakering Filtration Filtration Frume disposal Grinding	EQUIPMENT Pipeline Mechanical contact rectifiers Mixed bod exchanger Roll press, floating ring Electrostatically charged filter Asbestas-paper filter Glass fiber filter Catalytic combustion chamber	USER Hanna Coal Co. Various Various Consolidated Paper Co. Various Atomic Energy Comm. Various	Cadiz. Ohio Wayagemack. Ont. Hanford, Wash.	Sturries piped at savings compared with rail transport for distance over 100 mi. High ac-de. conversion efficiency at low voltages by mechanical switching rectifier. Gives water with less than I ppm. ionic solids by use of mixed anion and eation resists. For soft materials; does not plug. Known as Estacomizer. Self-charging. Uses dielectric properties of polyethylsus and other plastics. Filters minute dust particles. Capillary type filter, 50 times efficiency and 4 times life of sand filters. Euras hydrocarbon fumes on catalytic element at 8500 deg. F.	7,000 T/day coal line under construction, announced May 1931. Developed in U. S. by ITE Circul Breaker Co. Experimental use 1944 commercial use 1965—51. In commercial use 1965—51. In commercial use 1966—51. Two commercial units now in use after several years experimental development. Several such filters on market, developed by American Optical and others. Developed by A. D. Listle for AEC Made by Cambridge Corp. Experimental. Developed by Listle Combustic Corp. (Ruff process). Developed by Listle AEC must be Corp. (Ruff process). Developed by Listle AEC act Oal Carbot Chemical use. Laboratory research by Carbide Carbot Chemicals for AEC at Oal Carbot Che
OPERATION Coal transport Conversion Delonization Dewakering Filtration Filtration Filtration Funne disposal	EQUIPMENT Pipeline Mechanical contact rectifiers Mixed bod exchanger Roll press, floating ring Electrostatically charged filter Asbestos-paper filter Glass fiber filter Catalytic combustion chamber Canventional	USER Hanna Coal Co. Various Consolidated Paper Co. Various Various Atomic Energy Comm. Various Podry Process Co. Fhallips Petroleum	Cadiz. Ohio Wayagemack. Ont. Hanford, Wash.	Sturries piped at savings compared with rail transport for distance over 100 mi. High acde. conversion efficiency at low voltages by mechanical switching rectifier. Gives water with less than I ppm. ionic solids by use of mixed anion and eation resists. For soft materials; does not plug. Known as Estacomizer. Self-charging. Uses dielectric properties of polyethylsus and other plastics. Filters minute dust particles. Capillary type filter, 50 times efficiency and 4 times life of sand filters. Burns hydrocarbon fumes on catalytic element at 800 deg. F. Grinds at low temp, with liquid Ns. Uses liquid metals as heat transfer media. Radiant-beat, eramic-cup gas burns-	7,000 T/day coal line under construction, announced May 1931. Developed in U. 8. by ITE Circuit Preaker Co. Experimental use 1948 commercial use 1908 of the Commercial use 1908 commercial use 1909 of the Commercial use 1909 of the Commercial units now in a stree several years experimental development. Several such filters on market, developed by American Optical and others. Developed by American Optical and others. Developed by Catalytic Combustion Corp. (Ruff process). Developed by Linde Air Product Co. Commercial use. Laboratory research by Carbied & Carbon Chemicals for AEC at Oal Ridge.
OPERATION Coal transport Conversion Delonization Dewakering Filtration Filtration Filtration Frume disposal Grinding Heat transfer Heat transfer Liquid thermal	EQUIPMENT Pipeline Mechanical contact rectifiers Mixed bod exchanger Roll press, floating ring Roll press, floating ring Glass fiber filter Catalytic combustion chamber Conventional Motals	USER Hanna Coal Co. Various Consolidated Paper Co. Various Various Various Policy Process Co. Phillips Petroleum Co. Standard Oil Co.	Cadiz. Ohio Wayagemack. Ont. Hanford, Wash.	Sturries piped at savings compared with rail transport for distance over 100 mi. High acde. conversion efficiency at low voltages by mechanical switching rectifier. Gives water with less than I ppm. ionic solids by use of mixed anion and cation resists. For soft materials: does not plug. Known as Etacomiser. Self-charging. Uses dislectric properties of polyethylene and other plastics. Filters minute dust particles. Capillary type filter, 50 times efficiency and 4 times life of sand filters. Burns hydrocarbon fumes on catalytic element at 500 deg. F. Grinds at low temp, with liquid Ns. Uses liquid metals as heat transfer media. Radiant-beat, eramic-cup gas burners in two opposing walls. Will separate isomers or materials	7,000 T/day coal line under construction, announced May 1931. Developed in U. S. by ITE Circuit Preaker Co. Experimental use 1948 commercial use 1969-51. In commercial use 1969-61. Robins & Hasa Chemical Co. Two commercial units now in use after several years experimental development. Several such filters on market, developed by American Optical and others. Developed by A. D. Listie for AEC Made by Cambridge Corp. Experimental. Developed by Catalytic Combustic Corp. (Ruff process). Developed by Linde Air Product. Commercial use. Laboratory research by Carbide Carbon Chemical use.
OPERATION Coal transport Conversion Delonization Dewakering Filtration Filtration Filtration Frame disposal Grinding Heat transfer Liquid thermal diffusion Monitoring gas	EQUIPMENT Pipeline Mechanical contact rectifiers Mixed bod exchanger Roll press, floating ring Elsetroctatically charged filter Arbeston-paper filter Catalytic combustion chamber Conventional Metals Radiant heater	USER Hanna Coal Co. Various Various Connolidated Paper Co. Various Various Atomic Energy Comm. Various Pedry Process Co.	Cadiz. Ohio Wayagemack. Ont. Hanford, Wash. Elizabeth, N. J.	Sturries piped at savings compared with rail transport for distance over 100 mi. High acde. conversion efficiency at low voltages by mechanical switching rectifier. Gives water with less than I ppm. ionic solids by use of mixed anion and eation resists. For soft materials; does not plug. Known as Etacomizer. Self-charging. Uses dielectric properties of polyethylsus and other plastics. Filters minute dust particles. Capillary type filter, 50 times efficiency and 4 times life of sand filters. Burns hydrocarbon fumes on catalytic element at 500 deg. F. Grinds at low temp, with liquid Ns. Uses liquid metals as heat transfer media. Radiant-beat, eramic-cup gas burners in two opposing walls. Will separate isomers or materials with same b.p. Adaptation of mass spectrometry to	7,000 T/day coal line under construction, announced May 1991. Developed in U. B. by ITE Circular Service of the Commercial use 1995 of the Commercial use 1995 of the Commercial use 1995 of the Commercial use 1996 of the Commercial use 1996 of the Commercial units now in use after ceveral years experimental development. Several such filters on market, developed by American Optical anothers. Developed by Ambridge Corp. Experimental. Developed by Catalytic Combustio Corp. (Ruff process). Developed by Linde Air Preduct Co. Commercial use. Laboratory research by Carbide darbon Chemicals for AEC at Oal Ridge. First commercial unit; developed by Selas Corp. In pilot plant shage.
OPERATION Coal transport Conversion Delonization Delonization Filtration Filtration Filtration Filtration Fune disposal Grinding Heat transfer Heat transfer Liquid thermal diffusion Monitoring gas streams	EQUIPMENT Pipeline Mechanical contact rectifiers Mixed bod exchanger Roll press, floating ring Elsetrostatically charged filter Asbestos-paper filter Catalytic combustion chamber Convectional Metals Radiant heater Diffuser	USER Hanna Coal Co. Various Consolidated Paper Co. Various Various Various Atomic Energy Comm. Various Pedry Process Co. Phillips Petroleum Co. Standard Oil Co. of Ohio Various Aluminum Co. of	Cadiz. Ohio Wayagemack. Ont. Hanford, Wash. Elizabeth, N. J.	Sturries piped at savings compared with rail transport for distance over 100 mi. High acde. conversion efficiency at 100 mi. High acde. conversion efficiency at 100 mi. High acde. conversion efficiency at 100 woltages by mechanical switching rectifier. Gives water with less than 1 ppm. ionic solids by use of mixed anion and eation resiss. For soft materials; does not plug. Known as Stacomiser. Self-charging. Uses dielectric properties of polyethylene and other plastics. Pilters minute dust particles. Capillary type filter. 30 times efficiency and 4 times life of sand filters. Burns hydroarbos funes on catalytic element at 500 deg. F. Grinds at low temp, with liquid Ns. Uses liquid metals as heat transfer media. Radiant-beat, eeramic-cup gas burners in two opposing walls. Will separate isomers or materials with same b.p. Adaptation of meas spectrometry to continuous analysis of gas streams. Shows new trend toward use of internal combustion engines in process.	7,000 T/day coal line under construction, announced May 1991. Developed in U. B. by ITE Circuit Breaker Co. Experimental use 1944 commercial use 1905-31. In commercial use 1905-31. Two commercial units now in use 1945 commercial use 1905 commercial use 1906-31. Two commercial units now in use after ceveral years experimental development. Several such filters on market, developed by American Optical anothers. Developed by Ambridge Corp. Experimental. Developed by Laide Combustio Corp. (Ruff process). Developed by Laide Air Preduct Co. Commercial use. Laboratory research by Carbide de Carbon Chemicals for AEC at Oal Ridge. First commercial unit; developed by Salas Corp. In pilot plant stage.
OPERATION Coal transport Conversion Deionization Dewatering Filtration Filtration Filtration Forme disposal Grinding Heat transfer	EQUIPMENT Pipeline Mechanical contact rectifiers Mixed bod exchanger Roll press, floating ring Electrostatically charged filter Asbesta-paper filter Glass fiber filter Catalytic combustion chamber Convectional Motals Radiant heater Diffuser Mass spectrometer Radial Nordberg	USER Hanna Coal Co. Various Consolidated Paper Co. Various Various Various Atomic Energy Comm. Various Pedry Process Co. Phillips Petroleum Co. Standard Oil Co. of Ohio Various Aluminum Co. of	Cadiz. Ohio Wayagemack. Ont. Hanford, Wash. Elizabeth, N. J. Borger, Tex. Cleveland, Ohio Point Comfort,	Sturries piped at savings compared with rail transport for distance over 100 mi. High acde. conversion efficiency at low voltages by mechanical switching rectifier. Gives water with less than I ppm. ionic solids by use of mized anion and cation resists. For soft materials: does not plug. Known as Etacomizer. Self-charging. Uses dislectric properties of polyethylsus and other plastics. Filters minute dust particles. Capillary type filter, 50 times efficiency and 4 times life of sand filters. Euros hydrocarbon fumes on catalytic element at 500 deg. F. Grinds at low temp, with liquid Ns. Uses liquid metals as heat transfer media. Radiant-beat, eramic-cup gas burners in two opposing walls. Will separate isomers or materials with same b.p. Adaptation of meas spectrometry to continuous analysis of gas streams. Shows new trend toward use of internal combustion engines in process industries having natural gas fuel. Removes fine paper pulp particles from efficient by ultra-sonic agglornom engrices efform efficient by ultra-sonic agglornom efficient efform efficient by ultra-sonic agglornom efficient efficient efficient efficients of the paper pulp particles from efficient by ultra-sonic agglornom efficients.	7,000 T/day coal line under construction, announced May 1931. Developed in U. S. by ITE Circuit Preaker Co. Experimental use 1948 commercial use 1969-51. In commercial use 1969-51. In commercial use 1969-51. In commercial units now in use after several years experimental development. Several such filters on market, developed by American Optical and others. Developed by American Optical and others. Developed by Cambridge Corp. Experimental. Developed by Catalytic Combustics Corp. (Ruff process). Developed by Linde Air Product Corp. (Ruff process). Developed by Linde Air Product Commercial use. Laboratory research by Carbide Carbon Chemicals for AEC at Oal Ridge. Full seale experimental use. In commercial use; another installa
OPERATION Coal transport Conversion Devoalering Filtration Filtration Filtration Filtration Funce disposal Grinding Heat transfer Liquid thermal diffusion Monitoring gas streams Power generation Sonic agglomeration	EQUIPMENT Pipeline Mechanical contact rectifiers Mixed bed exchanger Roll press, floating ring Electrostatically charged filter Asbesta-paper filter Glass fiber filter Catalytic combustion chamber Canvestional Motals Radiant heater Diffuser Mass spectrometer Radial Nordberg gas engine generator Barium titanate sonie generator Gamma acceleraors.	USER Hanna Coal Co. Various Various Consolidated Paper Co. Various Various Atomic Energy Comm. Various Pedry Prossus Co. Phillips Petroleum Co. Standard Oil Co. of Ohio Various Aluminum Co. of America	Cadiz. Ohio Wayagemack. Ont. Hanford, Wash. Elizabeth, N. J. Borger, Tex. Cleveland, Ohio Point Comfort,	Sturries piped at savings compared with rail transport for distance over 100 mi. High acde. conversion efficiency at 100 mi. High acde. conversion efficiency at 100 woltages by mechanical switching rectifier. Gives water with less than I ppm. ionic solids by use of mixed anion and eation resists. For soft materials; does not plug. Known as Esteeming. Self-charging. Uses dielectric properties of polyethylsus and other plastics. Filters minute dust particles. Capillary type filter, 50 times efficiency and 4 times life of sand filters. Burns hydrocarbon funes on catalytic element at 500 deg. F. Grinds at low temp, with liquid Ns. Uses liquid metals as heat transfer media. Radiant-beat, eramic-cup gas burners in two opposing walls. Will separate isomers or materials with same b.p. Adaptation of meas spectrometry to continuous analysis of gas streams. Shown new trend toward use of internal combustion engines in process industries having natural gas fuel. Removes fine paper pulp particles from efficient by ultrasonic agglomeration.	7,000 T/day coal line under construction, announced May 1931. Developed in U. S. by ITE Circuit Preaker Co. Experimental use 1948 commercial use 1908 of the Commercial units now in use after several years experimental development. Several such filters on market, developed by American Optical and others. Developed by A. D. Listle for AEC Made by Cambridge Corp. Experimental. Developed by Catalytic Combustion Corp. (Ruff process). Developed by Linde Air Product Corp. (Ruff process). Developed by Linde Air Product Commercial use. Laboratory research by Carbide Carbon Chemical for AEC at Oal Ridge. Full seale experimental use. In commercial use; another installation coming. Developed by Brush Development Co. Commercial unit to be built. Pilot scale research by MIT asset.
OPERATION Coal transport Conversion Devoalering Filtration Filtration Filtration Filtration Frume disposal Grinding Heat transfer Liquid thermal diffusion Monitoring gas streams Power generation Sonic agglomeration	EQUIPMENT Pipeline Mechanical contact rectifiers Mixed bod exchanger Roll press, floating ring Electrostatically charged filter Asbostos-paper filter Glass fiber filter Catalytic combustion chamber Canvestional Motals Radiant heater Diffuser Mass spectrometer Radial Nordberg gas engine generator Barium titanate sonic generator Gamma acceleraors, x-ray unite Gross fission	USER Hanna Coal Co. Various Various Consolidated Paper Co. Various Various Atomic Energy Comm. Various Pedry Prossus Co. Phillips Petroleum Co. Standard Oil Co. of Ohio Various Aluminum Co. of America	Cadiz. Ohio Wayagemack. Ont. Hanford, Wash. Elizabeth, N. J. Borger, Tex. Cleveland, Ohio Point Comfort,	Sturries piped at savings compared with rail transport for distance over 100 mi. High acde. conversion efficiency at 100 mi. High acde. conversion efficiency at 100 woltages by mechanical switching rectifier. Gives water with less than I ppm. ionic solids by use of mized anion and cation resists. For soft materials: does not plug. Known as Etacomiser. Self-charging. Uses dislectric properties of polyethylense and other plastics. Filters minute dust particles. Capillary type filter, 50 times efficiency and 4 times life of sand filters. Burns hydrocarbon fumes on catalytic element at 500 deg. F. Grinds at low temp, with liquid Ns. Uses liquid metals as heat transfer media. Radiant-beat, estamic-cup gas burners in two opposing walls. Will separate isomers or materials with same b.p. Adaptation of meas spectrometry to continuous analysis of gas streams. Shows new trend toward use of internal combustion engines in process industries having natural gas fuel. Removes fine paper pulp particles from efficient by ultrasonic agglomeration. Sterilizes drugs with ionising radia-	7,000 T/day coal line under construction, announced May 1931. Developed in U. S. by ITE Circuit Preaker Co. Experimental use 1948 commercial use 1908 of the Commercial units now in use after several years experimental development. Several such filters on market, developed by American Optical and others. Developed by American Optical and others. Developed by Catalytic Combustic Corp. (Ruff process). Developed by Linde Air Product Corp. (Ruff process). Developed by Linde Air Product Commercial use. Laboratory research by Carbide Carbon Chemical for AEC at Oal Ridge. Full seale experimental use. In commercial use; another installation coming. Developed by Brush Development Co. Commercial unit to be built. Pilot scale research by MIT and Electronised Chemicals Co.
OPERATION Coal transport Conversion Delonization Dewakering Filtration Filtration Filtration Frume disposal Grinding Heat transfer Heat transfer Liquid thermal diffusion Monitoring gas streams Power generation	EQUIPMENT Pipeline Mechanical contact rectifiers Mixed bed exchanger Roll press, floating ring Elsestrostatically charged filter Class fiber filter Catalytic combustion chamber Conventional Motals Radiant heater Diffuser Mass spectrometer Radial Nordberg gas engine generator Barium titanate sonie generator Barium titanate sonie generator Gamma acceleracts, x-ray units	USER Hanna Coal Co. Various Various Consolidated Paper Co. Various Various Atomic Energy Comm. Various Pedry Prosses Co.	Cadiz. Ohio Wayagemack. Ont. Hanford, Wash. Elizabeth, N. J. Borger, Tex. Cleveland, Ohio Point Comfort,	Sturries piped at savings compared with rail transport for distance over 100 mi. High acde. conversion efficiency at low voltages by mechanical switching rectifier. Gives water with less than I ppm. ionic solids by use of mixed anion and eation resists. For soft materials; does not plug. Known as Edacominer. Self-charging. Uses dielectric properties of polyethylsus and other plastics. Filters minute dust particles. Capillary type filter, 50 times efficiency and 4 times life of sand filters. Burns hydrocarbon fumes on catalytic element at 500 deg. F. Grinds at low temp, with liquid Ns. Uses liquid metals as heat transfer media. Radiant-beat, ceramic-cup gas burners in two opposing walls. Will separate isomers or materials with same b.p. Adaptation of mass spectrometry to continuous analysis of gas streams. Shown new trend toward use of internal combustion engines in process industries haring natural gas fuel. Removes fine paper pulp particles from efficient by ultrasonic agglomeration. Sterilizes dand-ensative materials with eathode rays. Sterilizes drugs with ionising radiations. Useful for remote inspection of dand-	7,000 T/day coal line under construction, announced May 1931. Developed in U. S. by ITE Circuit Preaker Co. Experimental use 1948 commercial use 1908 of the Commercial units now in use after several years experimental development. Several such filters on market, developed by American Optical and others. Developed by A. D. Listle for AEC Made by Cambridge Corp. Experimental. Developed by Linde Air Product Corp. (Ruff process). Developed by Linde Air Product Commercial use. Laboratory research by Carbide Carbon Chemical for AEC at Oal Ridge. Full scale caperimental use. In commercial use; another installation coming. Developed by Brush Development Co. Commercial use; another installation coming. Developed by Brush Development Co. Commercial unit to be built. Pilot scale research by MIT asc Electronised Chemicals Ca. Developed by Brookhaven Nat. Lab In pilot plant.
OPERATION Coal transport Conversion Devasering Filtration Found disposal Grinding Heat transfer Liquid thermal diffusion Monitoring gas streams Power generation Social agglomeration	EQUIPMENT Pipeline Mechanical contact rectifiers Mixed bod exchanger Roll press, floating ring Elsestrostatically charged filter Class fiber filter Catalytic combustion chamber Conventional Motals Radiant heater Diffuser Mass spectrometer Radial Nordberg gas engine generator Barium titanate sonie generator Barium titanate sonie generator Gamma acceleracts, ray units Gross fission Gross fission Gross fission Gross fission Fray units Fray units	USER Hanna Coal Co. Various Various Consolidated Paper Co. Various Various Atomic Energy Comm. Various Pedry Prosses Co.	Cadiz. Ohio Wayagemack. Ont. Hanford, Wash. Elizabeth, N. J. Borger, Tex. Cleveland, Ohio Point Comfort. Tex.	Sturries piped at savings compared with rail transport for distances over 100 mi. High acde. conversion efficiency at 100 mi. High acde. conversion efficiency at 100 woltages by mechanical switching rectifier. Gives water with less than I ppm. ionic colids by use of mired anion and cation resists. For soft materials; does not plug. Known as Stacominer. Self-charging. Uses dislectric properties of polyethyless and other plastics. Filters minute dust particles. Capillary type filter, 50 times efficiency and 4 times life of sand filters. Burns hydrocarbon funes on catalytic element at 500 deg. F. Grinds at low temp, with liquid Ns. Radiant-beat, ceramic-cup gas burners in two opposing walls. Will begands isomers or materials with sandards and the same supportensively to continuous analysis of gas streams. Shown new trend toward use of internal combustion engines in process industries having natural gas fuel. Removes fine paper pulp particles from effuent by ultrasonic agglomeration. Sterilizes baat-cansitive materials with cathods rays.	7,000 T/day coal line under construction, announced May 1631. Developed in U. S. by ITE Circuit Streaker Co. Experimental use 1948 commercial use 1908-51. In commercial use 1908-91. In commercial use 1909-91. Robm & Hass Chemical Co. Two commercial units now in use after several years experimental development. Several such filters on market, developed by American Optical an others. Developed by A. D. Little for AEC Made by Cambridge Corp. Experimental. Developed by Catalytic Combustion Corp. (Ruff process). Developed by Catalytic Combustion Corp. (Ruff process). Developed by Catalytic Combustion Corp. (Ruff process). Full seale caperimental use. In commercial use; another installation coming. Developed by Brush Development Co. Commercial use; another installation coming.



How Process Equipment Costs Varied

Tabulated below are the annual average indexes of comparative equipment cost for eight process industries and four related industries, prepared by the Chicago and Los Angeles evaluation engineering firm of Marshall and Stevens. Extending from 1913 through 1951, the annual averages are supplemented by a tabulation of quarterly figures at the right.

A tabulation in this form, giving quarterly data, appears each month in an early page of our new equipment section, showing the latest revision for the quarter ending March, June, September or December. This

feature was introduced initially on pages 124-6 of our November 1947 issue, in an article by the late R. W. Stevens, partner of the firm, which described the basis for the 47 industry indexes regularly issued by the firm, and the method of weighting of the process industry average.

Charted above is the M & S 47-industry average plotted on the same grid with the Austin Co.'s index of industrial building costs, and the Engineering News-Record index of heavy construction costs.

All components of the M & S index held quite constant throughout 1951.

Equipment Cost Indexes

(Murshall and Stevens Indexes of Comparative Equipment Costs, 1928 = 100)

Industry Average of all	Dec.	Sept.	Dec.
	1980	1981	1990
	177.1	179.1	179.6
Process Industries Coment mag. Chemical Class products Glass mig. Pairt mig. Paper mig. Petroleum ind. Process ind. avg.	166.5 177.5 164.5 167.6 170.8 171.1 173.9 176.3 174.9	171.8 179.8 106.5 109.6 172.8 173.1 175.9 179.3 179.3	173.8 180.3 187.3 170.4 173.6 173.6 173.7 176.7
Ruisted Industries Else, power equip Mining, milling Refrigorating	179.1	181.1	181.0
	178.2	180.3	181.0
	195.8	198.6	200.1

Marshall and	Steve	ens /	Annual	Inc	dexes	of (Comp	parativ	e E	quip	ment	Cos	ts, 1	913	to 1	951	(1920	5 =	100)	
Industry	1913	1914	1915	1916	1917	1918	1919	1930	1921	1923	1993	1994	1935	193	111	97	1928	1929	1930	1931
Average of all	57.9	54.1	85.9	62.8	81.8	109.7	123.0	183.8	118.5	85.5	97.8	105.3	106.3	100.6	96	.0	96.5	91.9	87.0	76.9
Process Industries																				
Cement m/g	58.0	58.0	85.0	62.8	80.4	109.1	118.4	149.3	113.6	88.7	96.9	104.6	104.7	100.0	96		97.2	92.5	87.0	76.8 78.0
Chemical	86.8	56.0	56.6	63.0	81.2	111.9	129.6	150.5	113.9	82.5	96.0	106.8	107.2	100.0	100		96.9	93.4	86.1	78.0
Glass mfg	58.7	54.5	58.2	63.5	53.5	112.1	121.9	151.1	114.7	83.7	96.3	101.9	104.5	100			95.9	92.1	83.6	77.9
Paint mfg	88.2	55.2	88.8	62.8	90.0	108.0	119.8	148.6	116.3	84.1	65.8	104.0	108.4	100.0	94	1.1	94.6	91.7	83.7	78.6
Paper mig.	80.4	55.3	\$5.8	63.4	81.0	111.8	121.4	152,6	114.8	88.1	95.6	105.6	106.3	100.0		1.8	96.8	90.9	95.5	77.1
Petroleum ind	58.9	85.1	56.6 57.4	64.1	83.3 81.7	113.0	123.1	151.5	116.4	82.7 88.0	98.3	106.0	105.0	100.		.4	97.1 91.9	92.0	86.2	77.0
Related Industries	00.0	60.9	97.4	60.0	85.0	140.0	140.0	104.2	110.0	00.0	80.0	100.0	200.1	100.				01.0	00.8	01.0
Elec. power equip	20.1	XX 9	56.7	64.3	10.1	114.2	129.6	152.3	116.0	85.6	96.2	186.0	104.8	100.	0 94	1.2	86.9	91.5	56.1	78.1
Mining, milling	86.8	88.8	88.5	62.9	82.0	111.9	120.3	149.9	114.1	82.8	95.3	105.6	107.1	100.	96	1.7	97.3	92.9	86.7	76.8
Refrigerating	50.3	86.3	87.1	63.2	88.2	113.5	122.9	183.5	116.7	83.9	96.5	98.1	100.9	100.	0 94	1.3	97.0	93.0	96.4 96.2	75.0 88.1
Steam power	50.1	56.2	86.8	64.3	88.1	114.2	127.6	152.2	115.7	82.7	96.3	106.1	105.0	100.	0 00	5.4	20.9	81.10	89.2	88.1
Industry	1982	1933	1934	1905	1996	1937	1938	1939	1940	1941	1942	1943	1944	1945	1946	1947	1948	1949	1950	1961
Average of all	06.1	09.4	74.6	78.0	81.5	86.3	84.4	54.8	86.6	92.6	99.6	100.5	102.4	100.4	128.2	180.	6 162.6	161.2	167.9	180 1
Process Industries																				
Coment mfg	98.9	70.7		78.1	82.2	88.8	85.2	84.6	85.4	90.8	97.8	96,3	98.6	99.4	119.7	144.	3 186,8	156.6	161.6	173.7
Clay products	77.6	70.9	75.4 75.7	78.5 79.3	83.5	88.2 87.8	84.4	68.8 83.7	84.6	98.3 67.6	102.0	106.1 93.6	105.6	94.8	126.8	151.	\$ 164.8 \$ 151.5	164.5	156.6	180.7
Glass m/g	00.4	71.3	78.4	78.8	83.6	88.0	53.4	83.0	84.3	88.2	99.7	94.7	96.5	97.4	117.6	142	3 154.6	154.6	159.7	170.1
Paint mfg	71.7	70.1	74.6	77.3	81.5	87.4	83.9	88.9	84.9	90.3	97.3	98.3	100.1	101.0	121.2	146.	0 157.8	157.8	162.9	174.0
Paper mig	67.2	00.9	75.4	78.8	88.7	88.1	84.8	84.1	85.1	90.5	97.5	98.7	101.3	102.2	123.4	147	0 158.1	188.1	163.2	174.1
Petroleum ind	70.1	79.6	78.0	78.7 78.1	82.6	87.8	85.3	92.3 96.3	83.8 86.3	96.2	95.2	96.7	100.0	100.9	121.6	151	2 160.9 2 163.2	160.9	186.0	179.4
Rubber. Process ind. avg	73.2	70.7	78.5	79.0	82.4	88.2	84.3	83.6	84.4	91.5	99.2	100.6	103.9	108.8	123.0	140	2 161.1	161.9	167.0	178.1
Raistat Industries																				
Eas. power equip	76.1	78.7		78.7	82.7	87.9	94.3	86.1	85.8	90.3	98.8	97.8	99.3	100.2	122.9	180	9 166.1	188.1	271.3	183.1
Mining, milling	67.6	80.0		88.5	92.4	97.1 87.8	92.6	92.1	98.1	98.5	106.5	106.2	107.3	106.2	128.4	163.	0 168.2 2 178.7	165.2	170.8	181.4
Refrigerating.	70.0	71.3	75.4 75.8	78.0	82.7	87.0	82.3	81.7	89.7	00.0	92.1	92.8	93.9	94.8	116.0	141	7 158.	153.2	188.5	100.1



TO INVEST or not to invest-that is the question which this group must decide.

Venture Capital: Risk vs. Opportunity

In the chemical industry especially, opportunities for spectacular earnings carry a high element of risk. Here's how to avoid the numerous pitfalls awaiting the speculative investor.

FRED M. VAN ECK

From time to time the public's imagination is captured by newspaper and magazine stories telling of fabulous profits made from modest investments. One of the most spectacular successful ventures of recent years is that involving the Toni Co. This company was formed in 1944 by Richard Nielsen Harris with an initial investment of \$1,000. Its product was a permanent wave kit which women could use themselves to curl their hair at home instead of having it curled at a beauty parlor.

Less than four years later Harris, who was then about 34 years old, and an older brother, who had been given a half interest in the company in its early days in return for his services, sold the company, which was then earning over \$4 million per year, to the Gillette Safety Razor Co. for \$12 million, plus another \$8 million to be paid out of the next five years' earnings. That's quite a gain—from \$1,000 to \$20 million in less than four years! It seems only fair to mention that prior to forming Toni Co. Harris had invested and lost \$25,000 in another hair wave product which failed. In addition, he had spent much research time and effort in developing the superior product upon which success of the Toni Co. was based.

FRED M. VAN ECK is a member of the venture capital firm of J. H. Whitney & Co., New York. Another remarkable success story, that of the Bonanza Oil Co., was recently reported in the newspapers. About 40 individuals made an original investment of \$120,000 in this company for the purpose of finding oil by wildcat drilling. Its first oil well was brought in near Worland, Wyo., about a year ago. After completing ten producing wells, the owners sold all their common stock to a group in Texas for a sum reported to be about \$20 million.

Although the spectacular successes of venture capital investments may reach the headlines, little is heard about the more numerous losses and failures. The case of the Lustron Corp., however, has received wide publicity. Lustron was organized in the early post-war period with about \$38,341,000 of capital. Of this total, \$37,500,000, or 97½ percent, was supplied by the Reconstruction Finance Corp. The balance came from private sources of capital, mostly Midwesterners, many of them suppliers of the kinds of things Lustron would be buy-

When Lustron was liquidated in early 1950 only an estimated \$5 million, or 13 percent, was recovered. In about three years there was a capital loss of \$33 million!

OWNERSHIP INVOLVES RISK

Capital contributed by the owners in any corporation is known as equity capital. There is always some risk of loss, as well as opportunity for profit, attached to such ownership capital. The losses of the business affect the owners first, before any creditors; the profits benefit the owners last, only after the requirements of the creditors have been satisfied.

The degree of risk attached to equity capital varies with the nature of the business that is owned. For instance, the risk is small in owning the stock of a company which deals in proven products or services, has an established position in the market, and is run by an experienced management team. The risk is much greater in owning the stock of a new corporation with new, unproven products, an uncertain position in the market, and new management.

Venture capital may be defined as that portion of equity capital which takes greater than ordinary risks and on which the chances of loss are high. To offset this high chance of loss, there must be a prospect of considerable gain. Venture capital investments are most likely to involve, therefore, new products or processes or the development of new, unproven natural resources.

SOURCES OF VENTURE CAPITAL

From what sources does venture capital come? There are three different classes of investors: individuals, organized investment companies or partnerships, and established corporations.

In the chemical industry the major portion of venture capital for developing and commercializing new products or processes is provided by the established companies. These companies largely utilize for these purposes retained earnings and other internal sources of capital.

Let us look, for a moment, at some of the significant characteristics of the chemical industry. According to

or the significant characteristics of the chemical industry. According to Dept. of Commerce figures, there were 10,100 business entities classified in the chemicals and allied products industry as of Dec. 31, 1949. (A substantial number of these businesses were, of course, distributors.) In 1950 these companies had a total net sales of \$15,946 million and earned a net after taxes of \$1,275 million.

The National City Bank has compiled financial figures on 65 leading manufacturers of chemical products. Sales of these 65 companies were about \$6,330 million in 1950, and net earnings after taxes were \$742 million. It will be noted that less than 1 percent of the companies in this industry did about 40 percent of the business and earned about 60 perceut of the profit.

LARGE COMPANIES ARE DOMINANT

These figures clearly show that a relatively small number of large companies play a very large role in the dynamic chemical industry. Such companies typically spend millions of dolars each year on research and development and provide from their own internal resources the venture capital with which to exploit the fruits of their research laboratories.

Although there may be a smaller change in the business population of the chemical industry than of most other industries, nevertheless there are several hundred new businesses started each year in the chemical industry, and also several hundred each vear which discontinue business. And of those which discontinue operations, some even go into bankruptcy. Dun & Bradstreet reports that, in the five-year period 1946-1950, 267 businesses in the chemical industry failed, and that the liabilities of these companies totaled \$26 million.

Characteristics of the industry tend to limit the opportunities for successful venture capital investment by others than the established chemical corporations. The principal reason is that most new venture capital investment opportunities originate in the research laboratories of the established companies. An outstanding example is the development and commercialization

of synthetic fibers. No new group outside the established companies has made substantial progress in develop-

ing and marketing a new fiber.

Venture capital opportunities for individuals or investment companies are usually created by the invention and development of new products or processes by independent groups. Because of the substantial amount of costly development work required before a commercial chemical operation is feasible, independent inventor groups usually seek financial support from the industry.

THE ROLE OF TAXES

Federal taxes also play their part in this connection. Established businesses are permitted to charge off research and development expenditures as an expense against income before corporate income taxes of 52 percent and excess profits taxes of as much as another 30 percent. Individuals and investment companies must treat research and development expenditures as capital investment made with dollars accumulated after paying corporate and often individual income taxes. Their losses can be offset only by capital gains, not by current income.

But venture capital investment opportunities even in the chemical field may occasionally be open to individuals or-to investment companies organized for the purpose. One such firm, formed in 1946, is J. H. Whitney & Co., which uses its own financial resources to make venture capital investments. The firm's own partners and staff make organized, intelligent analyses and appraisals of such investment opportunities and the risks involved prior to making an investment.

Other firms with similar objectives have also been organized in the last five years. Some of the better known firms in this field include: American Research and Development Corp.; New Enterprises, Inc.; Wm. A. M. Burden & Co.; Fox-Wells & Co.; Payson & Trask; Rockefeller Bros., Inc.; Henry Sears & Co. The first two are located in Boston, the rest are in New York. Many of these firms specialize in different aspects of the venture capital business.

There are also a number of wealthy individuals who make venture capital investments. And even small individuals can sometimes make venture capital investments when speculative public issues are put on the market.

THE SPENCER STORY

One of J. H. Whitney & Co.'s first investments was made in the Spencer Chemical Co. As World War II got under way, Kenneth A. Spencer studied the need for more chemical plants in connection with the vast coal and natural gas reserves of his home territory around Pittsburg (Kan.) and Kansas City. He compiled a 6-in. thick brochure about manpower, raw materials, transportation, security, etc., and went to Washington to see what could be done.

As a result the government built a group of war plants centering around the Jayhawk plant, which supplied ammonia to nearby Kansas and Oklahoma powder and shell-loading plants. The government asked Mr. Spencer to run the Jayhawk plant.

SPENCER RESCUES JAYHAWK

When the war ended, the energetic Mr. Spencer resolved to save the Jayhawk plant from oblivion. With some financial help from J. H. Whitney & Co., the Spencer Chemical Co. was formed to take over and operate the plant, principally for the production of ammonia, ammonium nitrate solution, and fertilizer grade ammonium nitrate. Mr. Spencer predicted a strong market for ammonia fertilizer material, even though the farm market for this had been very poor prior to the war, and many so-called experts were skeptical.

Under able management, the company has prospered and grown. The initial capacity of 300 tons per day of ammonia has been increased to over 500 tons per day. Spencer also purchased from the government a plant which was built at Henderson, Ky., for the production of ammonia from cokeoven gas, and converted it to use natural gas. A new plant to make ammonia from natural gas is being built at Vicksburg. Miss.

Diversifying its products, the company has gone into the production of methanol, formaldehyde, dry ice and other products. Sales in the fiscal year ending June 30, 1951, were almost double sales in 1947, the first full year of operation, and the company is continuing to grow. Its assets now total almost \$49 million.

FACTORS TO CONSIDER

Whether a venture capital investment is being considered by an individual, an investment company, or an established corporation, a decision on making an investment is likely to be influenced by similar factors. What are some of the principal factors to consider?

One of the first questions to investigate is the stage of development of the proposal. Is it just an idea in the mind of the inventor? Has it been carefully thought through with complete theoretical analyses? Has it been

experimentally tested to be sure that it will work in practice? Have yields, quality of product, types of equipment required and their suitability, and best operating conditions all been checked on a pilot scale in order to get the best basis for realistic estimates of plant and operating costs?

The chemical engineer is likely to play an important role in answering these questions. He is probably best qualified to appraise the status of a new process, the results of analytical

and laboratory tests, and whether suf-

scient pilot plant data of the right type have been obtained.

If laboratory or pilot plant information is inadequate the chemical engineer can indicate what additional information is necessary and can recommend a program, with estimates of cost and time, for obtaining it. It may be advisable to set up a program calling for periodic reviews of results and for revised estimates of the prospects and work required before proceeding to the next stage of development.

COMPETITIVE TECHNICAL RISKS

At any stage of development the potential venture capital investor will want to know the competitive position of the process. Is the process patentable, and, if so, is the patent position likely to be basic? What other similar processes are under development? Who are doing this development work? What is the status of these other developments? Are there other processes as good as or better than the one under consideration? What are the prospects of better, more economical processes being developed soon?

The answers to these questions will give some idea of the competitive technical risks involved. Again, the chemical engineer will be expected to provide answers to these questions and advise an investor in these matters.

FOR EXAMPLE: TITANIUM

An excellent current illustration of a situation involving competitive technical risks of substantial magnitude exists in the commercialization of titanium metal. Probably no other metal has got off to such a fast start and with the prospect of such intensive competition in the development of processes for its manufacture.

As recently as 1946 titanium metal was little more than a laboratory curiosity. Late in that year the Bureau of Mines announced that it had placed in operation the first pilot plant pro-

ducing titanium.

Du Pont in 1942 had begun research which paralleled to a considerable degree the research done by the Bureau. In July 1948, Du Pont announced that its first commercial pilot plant, with a capacity of about 100 lb. of titanium per day, was in operation. Two additional units, larger in size and of improved design, were later erected. Last April a semi-commercial plant with a nominal capacity of 500 tons per yr. was placed in operation by Du Pont at Newport, Del.

Meanwhile, at least six other industrial groups have been active in the development of processes to manufacture titanium. Titanium Metals Corp. is modifying a government plant at Henderson, Nev., with an anticipated annual production rate of about 3,600 tons of titanium by the end of this year. Other companies which are known to be working on titanium are Crane Co., Horizons Titanium Corp., P. R. Mallory, Monsanto, and National Research Corp.

In addition to these industrial organizations, research on titanium processes is being carried out in the laboratories of universities, research foundations, and government agencies. A graduate student at Columbia University has recently reported substantial progress toward the development of a new electrolytic titanium process.

Suppose some group comes up with a really good, cheap process. What effect will this have on the \$14 million investment that Titanium Metals Corp. is making in production facilities at Henderson?

COMMERCIAL COMPETITION

Besides technical competition, you must consider some of the other competitive conditions which a new commercial operation would have to face. The potential investor will want to know the nature and sources of raw materials and their prices. How do these compare with the materials and prices available to competitors? He will also wish to know how the processing cost of the new product compares with that of actual or potential competitors.

Further, he needs to know the competitive position which he will occupy in marketing his product. Is the product to be sold in competition with enteroched producers? Could established producers cut their prices to try to force a newcomer out of business? Does product quality meet the requirements of users? What price can be obtained for the product? Is there any geographic advantage to the proposed plant location? Again, the chemical engineer can make a very real contribution in developing the facts which will answer these questions.

Capital requirements must be esti-

mated with the help of the chemical engineer who is familiar with plant and equipment costs. The question often arises as to the size of an initial commercial operation. Should an effort be made to supply the whole market at once? Or is it wiser to start with a small plant, establish a going operation, and then expand as seems most prudent?

Preliminary figures will indicate whether profit prospects in relation to capital investment are at all interesting. Should the preliminary figures look interesting, the engineers can then lay out a plant and obtain more detailed estimates of capital investment, operating costs and profit pros-

pects.

WANTED: GOOD MANAGERS

But even with an attractive process, favorable competitive conditions, and interesting profit prospects in relation to the invested capital required, there is still another important factor to consider — management. Is capable management available? Without it, engineering may be inadequate; plant location may be poor; plant and operating costs may soar above estimates; supply of raw materials may be unsatisfactory; a poor quality product may be put on the market; yields may be low; labor trouble and strikes may be encountered; all with consequent losses to the owners.

There is no substitute for good management, and it must be available before most venture capital investors will proceed with an investment. Here is the opportunity for the chemical engineer with business ability!

Whenever we try to decide whether or not to put money into a new process, this question arises: What rate of return on invested capital will make the project attractive? The answer to this question is not a simple standard against which all investments can be compared. It depends on two factors. First, what are the risks? Second, what alternate opportunities are there for employing available capital and what return do they offer?

The optimum size of the initial investment will also affect the availability of capital and consequently the rate of return expected. In the chemical industry a substantial amount of capital is usually required both to develop new products or processes and to initiate a minimum-size but economical commercial operation.

As long as economic progress continues there will be a need for venture capital investments. And in the free enterprise system investment of the needed capital will be inspired by profit prospects exceeding the risks.



CUT UP an old heat exchanger like Sun Oil Co. did. Sun's collections yielded 16 million pounds of steel scrap.



TEAR DOWN obsolete installations like the old asphalt stills above, contributed by Standard Oil Co. (California).

SCRAP: It's Got to Come From SOMEBODY'S Backyard

During 1951, the Nation's steel mills and foundries operated on a dangerously low margin of scrap inventory. At year's end, mill stockpiles averaged no better than a twenty day supply at best. Some mills had only a few days' supply on hand.

The situation was worsened by the fact that in cold weather months, snow and ice hamper the collection and transport of material. With the defense program beginning to roll, bettering the 34 million gross tons of purchased scrap collected in 1951 was more than a goal, it was a necessity.

A quick check by Chemical Engineering revealed that chemical companies were responding on all sides. Good housekeeping yielded a fixed total each month, but many firms were setting examples by getting after the dormant stuff, the standby equipment, the useless installations and the junk hoards. Some of the companies were also collecting a good price for their finds. (As high as \$35 a ton in the San Francisco bay area.)

Many firms were alerting all divisions and plants to keep an eye open for the extra pieces of dormant scrap normally missed. Cyanamid's Calco division regularly needles all workers with front page stories in the employee newspaper telling where to look for and how to report any scrap finds.

At the last we'd heard, Carbide & Carbon Chemicals Co. had already collected and sold 1,445 gross tons of dormant scrap metals—1,300 gross tons of cast iron and steel and 145 gross tons of stainless and non-ferrous scrap.

In the petroleum industry, Sun Oil Co. set an example by dismantling obsolete refinery units, buildings, storage facilities and other units which may have ordinarily been permitted to linger in place for another year or two. Sixteen million pounds of steel scrap and 140,000 lb. of copper and brass were the order of yield at Sun. This company's efforts were especially commendable since, at Marcus Hook, it cost \$91,000 to prepare scrap that sold for about \$86,000.

At M. W. Kellogg's Jersey City shops, a specially appointed scrap director was ferreting out scrap at the rate of 600,000 lb. a month. Normal collections had been running 200,000 lb. a month.

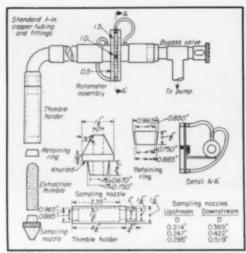
These are just a few, but there were many examples of intensified "scrap snooping" all over the country. The industry was clearly measuring up to its responsibilities.



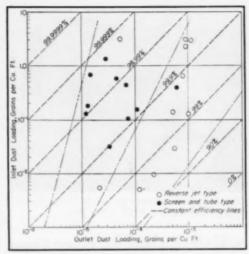
BIG STUFF helps the blast furnace turn out steel for defense. One fourth of an open hearth charge is purchased scrap.



SMALL STUFF easily adds up to tonnages. Cyanamid's Calco Division alerted its employees to gather the above material.







COMPARISON of influent and effluent loadings.

How Dust Collectors Perform

Field tests of air cleaning devices indicate for you the range of usefulness of several types of commercial dust collection equipment now available to industry.

RICHARD DENNIS, G. A. JOHNSON, M. W. FIRST and LESLIE SILVERMAN

Proper selection and application of dust collection equipment depends upon a knowledge of performance: capacity, power requirements and over-all dust retention characteristics. The concentration and size distribution of the collector effluent, in relation to the many possible variations that occur in industrial dust loadings, are particularly significant. Available information is limited primarily to manufacturers' data or to tests which supply only a partial correlation between nature of the aerosol and performance.

A field investigation of common types of commercial air cleaning equipment was undertaken by the Air Cleaning Laboratory of Harvard University for the purpose of expanding knowledge of collector performance. This report is concerned with the results of field tests on filter and inertial-type collectors. Studies on wet collectors and electrostatic precipitators are now in progress.

THE AUTHORS of this paper are affiliated with the Department of Industrial Hygiene, Harvard School of Public Health, Boston.

Field tests afford a cross-section of actual industrial experience by providing information on maintenance and cleaning problems as well as operating performance. In addition, they offer a diverse range of aerosols, collectors and operating conditions.

TYPES OF AIR CLEANERS INVESTIGATED

Dust collectors tested included inertial separators and filtration devices ranging in capacity from 600 to 32,-000 cfm. An effort was made to select representative units.

Inertial type collectors included cyclones, mechanical centrifugal collectors and a combination unit described below. Cyclones with rectangular, tangential inlets and vertical or tangential exit pipes were among those tested. Centrifugal exhausters with specially shaped blades to assist dust separation are included under mechanical centrifugal collectors. A third type relies on particle inertia to

This paper is based on a talk before the American Industrial Hygiene Asm., Atlantic City, April 24, 1981. The study was made under Contract AT(30-1)841 between the Atomic Energy Commission and Harvard University. The opinions expressed are those of the authors and do not necessarily represent the views of the ABC. concentrate the entering dust suspension at the small end of a straight, slotted conical section. Ninety percent of the air passes through these slots to blower and stack, while the concentrated suspension (10 percent of the air) is exhausted to a small cyclone whose effluent is recycled to the concentrator.

Cloth filter collectors fall into two categories: (1) Those operated with low face velocity (1-4 fpm.), having sateen-weave cotton cloth screens or tubes, and cleaned intermittently by mechanical shaking or rapping while air flow is shut off and (2) those operated with high face velocity (20-50 fpm.), having hard-pressed wool felt bags, and cleaned by the reverse airjet principle. A concentric, slotted cleaning ring, controlled by bag resistance or a timer, directs a high velocity air-jet against the outside of the bag and blows the accumulated cake into a dust bin. No interruption of air flow is required during cleaning.

FIELD SAMPLING AND TESTING METHODS

All dust sampling was conducted according to fundamental sampling principles pointed out by Silverman';

i.e. collecting sufficient number of samples to represent the entire flow, obtaining a large enough sample for accurate weighing and sizing, and collecting the dust at isokinetic sampling velocity to prevent alterations in concentration and composition.

Inlet and outlet dust loadings greater than 0.1 grain per cu. ft. were sampled with a 1½ in. dia. probe directed into the air stream as shown. To avoid non-uniform air velocity and dust loading distributions, samples were taken whenever possible in straight sections of duct at least 10 pipe diameters downstream from elbows, tees, etc. Whatman paper extraction thimbles (19 x 90 mm.) placed in the head of the sample probe permitted better than 95 percent capture of dust⁸ and avoided the problem of deposition on the tube.

The technique of drying and weighing thimbles before and after use (they were equilibrated in a 110 deg. C. oven and desiccated) was considered accurate to 1 mg. Isokinetic sampling velocities were obtained by two devices, a series of six interchangeable entry probes (0.214 to 0.529 in. dia.), which provided a six-fold range in velocity for a constant sampling rate, and a control valve attached to a 3 or 6 ft. length of probe tube extension which permitted air flow variations from 0 to 3 cfm.

A small rotameter with a restricting orifice, connected by a swivel joint across the taps of an orifice meter, furnished direct air flow readings and eliminated field handling difficulties associated with liquid manometers. A high volume sampler (40-60 cfm. capacity) containing pleated paper filters (0.58 sq. ft. surface area) was employed to sample collector effluents when dust loadings were less than 0.1 grain per cu. ft.

Sampling periods of 2-4 hr. usually provided sufficient material for gravimetric analysis and particle sizing. Filters were equilibrated and weighed (accuracy ± 1 mg.) at 114 deg. C. in a modified textile balance according to the technique described by Silverman and Viles*.

Since high volume samplers were often placed in the clean air chamber of cloth filter collectors where air velocities ranged from 1.0 to 50 fpm., isokinetic sampling velocities could not be attained without reducing sampling rate to a point where insufficient dust was collected. However, failure to sample isokinetically produces negligible inertial segregation in the case of the fine dusts (<1.0 micron) penetrating this type of collector.

Capacity and air velocity were usually determined by standard Pitot

traverses in entry or exit ducts. In a few instances, fan static pressure, speed and horsepower requirements were used to estimate air flows. Collector resistance was calculated from inlet and exit duct static pressures and velocities except for filters where cloth resistance alone was measured.

Particle size data for each sample were determined by the light-field microscopic measurement of 400 to 500 particles. Median sizes by count and weight were estimated from logarithmic probability plots. To establish the curve shape in the 85 to 99.99 percent range, (relatively few particles) a supplementary sizing within this range was made by Whitby's method.

Mass distributions were obtained from the Hatch and Choate relation-

TEST RESULTS

Test results appear in the accompanying table (p. 198).

Test data for cyclones, (1-7) show no definite correlation between entry dust loading and over-all collection efficiency, although Larcombe" (confirmed by experiments now in progress at Harvard Air Cleaning Laboratory) has indicated a perceptible increase in efficiency with increased dust loading. Observed efficiencies and pressure losses generally conform to experimental and manufacturers' data for large diameter cyclones. The magnitude of effluent concentrations shown by Tests 1-3, indicates that large diameter cyclones are not suitable for collecting fine dusts. However, as a precleaning device to reduce dust concentrations entering high efficiency collectors or as the final collector for coarse, non-toxic materials, the large diameter cyclone is satisfactory.

Performance data for mechanical centrifugal collectors (Tests, 8-10) indicate that collection efficiencies for low concentrations of fine dust are comparable to those of cyclones and similar applications are suggested.

Information on a dust collector described by the manufacturer as an "aerodynamic separator" (Test 11) is limited but conforms to the performance range expected of inertial-type cleaners. On the basis of this test, no particular advantages appear in the use of this device over the usual inertial types of collectors.

Tests 12-33 summarize performance data for commercial air cleaners of the cloth filter type. Although all weight collection efficiencies exceeded 99 percent, the effluent dust concentrations from the reverse jet type were consistently higher for equivalent inlet dust loadings. (See chart.) The absolute amount of dust passing a re-

verse jet type unit was small, however, (approximately 1.0 grains per 1,000 cu. ft.) and in most instances represented satisfactory collection.

Tests 23-29 show five out of seven units discharging dust concentrations ranging from 0.8 to 1.1 grains per 1,000 cu. ft. Although the two remaining tests (27 and 29) show higher concentrations (2.5 and 2.1 grains per 1,000 cu. ft.) their significance is discounted because of suspected leakage.

Tests 18 to 20 (referring to screen type units) show effluent loadings for a similar dust (alundum) ranging from 0.03 to 0.11 grains per 1,000 cu. ft.

Within the limitations of the particle sizing technique employed, the size distributions of all cloth collector effluents were much the same. For collectors with no obvious leakage the effluent dusts had 98 percent of their mass represented by particles smaller than 5 microns.

Cloth resistance of reverse jet type collectors (as observed in the field) was higher than that of screen and tube types, but, in general, the reverse jet collectors were handling 5 to 10 times the volume of air per square foot of cloth.

In the reverse jet unit (for constant air flow), resistance is subject to continuous automatic control if the dust load does not exceed the cleaning capacity of the air jets. Resistance of screen and tube collectors increases in proportion to the amount of dust deposited on the cloth.

When screen or tube and reverse jet units had identical resistances for capacities of 2 and 30 cfm. per sq. ft. of cloth, respectively, the former unit presumably had a much denser layer of dust deposited on the cloth. The data do not permit analysis of the influence of resistance and velocity on

It should be pointed out that the accuracy of field testing data is not comparable to that of laboratory testing. Although the sampling methods in themselves were considered reliable, variable plant operating conditions and complicated equipment arrangements occasionally required improvisations in sampling techniques. In addition, field results sometimes reflect faulty collector operation.

Test results do not necessarily show optimum or expected performance since many collectors were poorly maintained or where operated in excess of design capacity.

CONCLUSIONS

Proper evaluation of commercial air cleaners depends upon a knowledge of their performance characteristics in relation to specific requirements for industrial application. Field testing of common types of dust and fume collectors provides a practical means of investigating their performance characteristics under a variety of operating

Based on the results obtained in this study and those of other investigators, the following conclusions may

Large diameter cyclones and similar low resistance centrifugal and inertial type collectors are not suitable for the recovery of fine dusts (<1 micron). Such devices are satisfactory for the separation of coarse, innocuous materials, i.e. wood or metal chips, and they may be useful as precleaners to

reduce dust loadings entering high efficiency collectors.

The cloth collectors studied discharged effluent dust concentrations sufficiently low to satisfy usual industrial air cleaning requirements. Effluent concentrations (for inlet loadings of abrasive dusts in the range of 0.05 to 5.0 grains per cu. ft.) were considerably higher for reverse jet than for bag and screen collectors. Effluent concentrations obtained by field tests on screen and bag type collectors ranged from 0.01 to 0.1 grains per 1,000 cu. ft. (in most instances) and for reverse jet types from 0.05-1.0 grains per 1,000 cu. ft. Power requirements (for equal air volumes) were higher for reverse jet filters.

Ratings of commercial air cleaners for pollution control work should be based on absolute effluent concentrations, independent of inlet loading and efficiency.

REFERENCES

REFERENCES

1. Silverman, Leelie, "Sampling of Industrial Stacks and Effluents for Atmospheric-Pollution Control," Proc. of the First Natl. Air Fol. Symp., March 1951, Stanford Research Institute.

2. Trooten L. J. 2018 1923).

3. Silverman, L. and View, F. Jr., Jr., Jour, Ind. Hyg. and Tex. 30, 128 (1948).

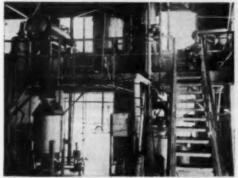
4. Whitby, K. T., "Determination of Particle Size Distribution-Apparatus and Techniques for Flour Mill Dust." Bull. Univ. Minn. Inst. of Tech. Expt. Stat. B. Drinker, P. and Hatch, T., "Industrial Dust." McGraw-Hill Book Co., New York (1938).

6. Larcombe, H. L. M., Min. Mag. 77, 137 (1947).

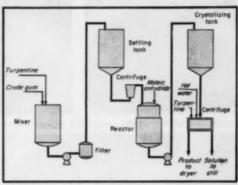
DATA assembled from tests on representative models of commonly used commercial dust collection equipment.

		_			Dust Descripti					Pres	mire.		
				-Talet-			-Outlet-		Ale		Lom		
Tort and			Loading, Orains Per	Counf Median,	Mam Median,	Loading, Grains Per	Count Median,	Man Median,	Flow Rate, (S.T.P.)	***	Acrom Collector, In. of	Collection Fflicioncy	Diamete
Unit	Operation	and Material	Cu. Pt.	Microns	Microns	Cu. Ft.	Microus	Miscons	Cfm.3	Velocity *	Water*	by Wt.	Ft.
A-Cy	rciones (C), mech	anical-contribu	al (CY) and	inertial (C	i) callectura								
1 (C)	Drying	find & gravel .	88.0	0.88	8.2	8.0	0.48	3.2	12,300	2,000	1.9	86.9	9.0
2 (C)	Drying	Gravel	16.8	0.88	8.6	2.4	0.48	2.2	4,600	1,700		86.0	8.04
(C)	Drying	Bank	18.7	1.1	9.4	6.1	0.78	6.4	4,600	1,700	0000	T8.0	8.04
(C)	Abrasive	Tale	9.3	0000	***	0.154		0.00	2,306	1,000	0.33	93.0	7.0
(C)	Planing mill	Wood	0.1			0.003	0 = 0 *		3,500	3,100	3.7	97.0	8.0
(C)	Grinding	Aluminum	0.7			0.077			2,400	1,400	1.2	80.0	6.0
(C)	Flocking	Cotton	0.7	0000		0.054	0.00	****	3,600	2,400	1.6	90.0	5.8
(CT)	Rubber	finck Fluffy	0.6	0.6	1.7	0.072		0 = 0 0	3,300	4,800	9.0	88.0	3.0
AC1000	dusting	sinc eteazate	1.7	0.0	1.7	0.374			750	2,400		78.0	2.0
(CT)	Grinding	Torre condo	0.383	0.00	3.2	0.000	0.44	2.8	11,900	3,780	4.7	56.3	4.0
(CT)	Cirinding	Iron scale, mand	0.381	0.00	0.2	0.000	0.44	2.0	11,000	0,700	4.7		
(CI)	Drying	Sand, gravel	5.8	0.48	3.8	2.9	0.48	3.2	12,300	1,700	4.0	80.3 (Co	me outry 16 me exit 4 me lgth. 96
Test I	B-Cloth screen (S) and tube (T)	collectors d	named by	suchanical sh	sking						(00	me agen. we
- COM	Founding	Iron scale	0.68	0.68	2.6	0.000015			7,000	2.5	1.8	99.99	
(T)	Lonnaring	SiO _x	0.68	0.00	2.0	0.00010	****	****					
la(T)	Founding	Bronge scale SiO ₂	0.44	0.82	****	0.000000	0.57	****	500	0.8	8.0	99.98	
1b(T)*	Founding	Bironge scale SiO ₂	0.595	****	****	0.000048	****	****	1,880	2.6	0.8	99.00	
4 (T)	Founding	Iron scale SiOs	0.53	0.71	165	0.000013		****	2,000	2.2	2.9	99.99	
5 (8)	Granite chipping	Granite	0.002	0.46	3.9	0.000028	0.41	1.1	7,000	2.3	3.0	99.91	
s (S)	Founding	f Iron scale \	0.39	0.47	6.3	0.00068	0.37	8.4	18,300	1.5	1.9	99.85	
7 (8)	00	1 SiOu	0.19	0.56	48 -	0.000013	****		13,900	1.3	1.3	99.90	
(B)] Truing &	(AloOu	0.18	0.51	4.3	0.00011	0.43	0.87	33,000	4.1	2.9	99.95	
(8)	shaping	SiO ₀	0.10	0.57	4.4	0.000074	0.48	0.96	33,000	3.2	4.1	99.98	
0 (8)	grinding	1	1.38	0.45	4.0	0.0000	0.38	0.89	4,530	1.4	1.7	99.90	
1 (8)	whoels &		0.88	0.60	3.2	0.0035	0.46		33,000	8.3	3.3	99.73	
2 (8)	Rubber	Tale	4.8	1.3	****	0.0064	****	****	7,000	****	7111	99.85	
Test	C-Cloth bag col	lectors cleaned	by reverse a	ir jet									
10) Troing &	(AliOi)	0.130	0.83	18.0	0.001	0.42	0.89	18,500		4.0	90.28	
14	shaping	8IC	3.360	0.70	7.2	0.0009	0.43	1.1	930	5.5	3.8	99.96	
35	grinding		0.680	0.80	8.8	0.0006	0.41	0.75	1,200	7.2	3.8	99.88	
16	wheels &	1	3.10	0.32	10.0	0.0000	0.46	0.72	9,500		3.2	90.97	
17	sticka,		3.65	0.54	3.3	0.0005	0.48	2.0	8,000		3.9	99.95	
19	etc.		2.44	****		0.0011	0.43	0.74	12,000		3.1	90,95	
19)	B ₀ C	0.078	0.48	2.3	0.0031	0.43	1.8	2,200		3.6	97.20	
10	Motal	Polishing	0.000		9.8	0.00022	0.42	1.2	8,000		6.4	97.62	
11	polishing	20088	0.004	8 0.43	1.3	0.00013	0.48	0.56	8,000		3.6	97.81	
13a	Crushing &	BeO	0.14	6400	2000	0.00052			9,000		2.4	90.63	
136	grinding		0.000	****		0.00087			9,000		2.4	96.08	
190	Founding Drying	BeOgeros Tapiona	0.005 8.17	4.0	7.7	0.000022	0.43	1.1	9,000		4.4	90.50	

* STF=70 deg. F. 760 mm. Hg. * Equivalent to ontry velocity for contribugal collectors; efm. per eq. ft. of cloth for arreen and tobe collectors. * With cloth filters, pressure dre cloth is indicated; total available static pressure for CT collectors. * Tangential exit. * 90% dust; 9.5 mm. average diameter. * Unit 33a following replacement of were-



PILOT PLANT features simple, easily maintained equipment. FLOW of material: From pine tree to printing inks.



Promising New Pine Gum Process

Produces maleo-pimaric acid, a new chemical from crude pine gum. Pilot plant work indicates that the process will be commercialized in the near future.

E. P. WAITE, D. N. COLLINS and H. B. SUMMERS, JR.

Maleo-pimaric acid is being produced in the pilot plant of the Southern Regional Research Laboratory's Naval Stores Station in Olustee, Fla. Results of the pilot-scale work indicate that the gum naval stores industry would have little difficulty in making the acid for commercial use. Several pine gum processing firms are in fact considering the manufacture of the new acid while other companies are making market surveys.

Properties and Uses-Maleo-pimaric acid is a white crystalline powder with an acid number of 400 to 410 in 70 percent acetone solution; it is soluble also in ether, alcohol and aromatic solvents. It is insoluble in aliphatic hydrocarbons, water and in turpentine. Melting point is in the range of 220 to 225 deg. C.

In printing inks the acid produces more brilliant and more workable azo pigments than the maleic-modified rosin now used.

The Southern Regional Research Laboratory at New Orleans, currently testing the esters of the acid to plasticize polyvinyl chloride, reports good results. The plasticizer, although not equal to the high-priced sebacates in performance, is able to compete on a cost basis.

The acid soap has been evaluated as an emulsifier in synthetic rubber production; the rubber produced com-pared favorably with the standard

How It's Made-Crude pine gum is diluted with turpentine and filtered. Unlike present commercial practice ("Olustee Process") in pine gum, cleaning must be done below 75 deg. C. to preserve the reactive components of the gum. After removal of water, the cleaned gum is reacted with maleic anhydride at moderate temperature. On cooling, the crystalline addition product is separated from the liquid by centrifuge, then washed and

One part of crude gum is dissolved in two parts (by weight) of freshly distilled turpentine in an open-tank. A high-speed agitator with a flat, sawtooth-type impeller is used to aid in obtaining the solution. The agitator reduces the size of the chips and bark and other solid trash in the gum so that they, along with the solution, can be pumped to a filter of the enclosed plate type.

The filtered solution is allowed to settle to remove part of the water. Remainder of the free water is separated by means of a high-speed centrifuge. After this, the water-free solution is placed in a jacketed reaction kettle-either in solid form or dissolved in acetone-and maleic anhydride is added. The solution is stirred with a slow-speed agitator during addition and until the beginning of crystallization (about 30 min.). Then it is held in a tank for 48 hr. to allow maximum crystallization.

Next step is to remove the product crystals from the mother liquor in a basket centrifugal. Then comes a thorough washing—first with fresh turpentine to remove adhering gum solution, then with hot water to remove the turpentine. Quality de-pends largely on this cleaning step.

Thoroughly clean crystals are airdried to a white powder, the final product. The filtrate from the basket centrifugal is steam-distilled to give a maleic-modified rosin and to recover the turpentine, which is unchanged by the processing.

Pilot-Plant-A typical run will use 200 lb. of crude gum, about 400 lb. (about 60 gal.) of turpentine (freshly distilled) and 14 lb. of maleic anhydride of commercial grade. When the maleic anhydride is to be dissolved in acetone, 5 lb. of the solvent are re-

Average yield of maleo-pimaric acid using these amounts is close to 35 lb. -about 20 percent by weight of the crude gum, free of trash and water. Before maleic anhydride is added to

(Continued on page 201)

E. P. WAITE, D. N. COLLINS, and H. B. SUMMERS, JR., are members of the Naval Stores Research Division. Naval Stores Station, Bureau of Agricultural and Industrial Chemistry, United States Department of Agriculture. The work described was performed at Olustee, Fla.

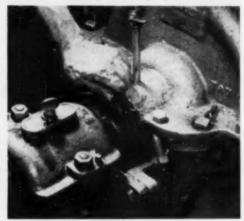






Left to right: long-fiber asbestos yarn packing, ammonia rod packing, and skived gland rings and slush pump sleeves.





Packing rings should be tamped into position one at a time for a firm fit, and all joints should be staggered around the pump shaft. At right: completing the packing operation on this centrifugal pump. Braided asbestos is the packing used here.

Increasing Packing Life

A little extra care in storing, installing and lubricating packings can greatly increase their life. This in turn means lower maintenance costs and minimum loss of production time.

E. L. SPENCE

Because packings may be stored for a long time before use, they should be placed in a cool, dry room away from direct sunlight. Rubber sheet, diaphragm sheet and cloth inserted sheet, usually delivered in rolls, should be immediately placed in roll-racks. Other types of sheet packing which are furnished in square sheets instead of rolls, should be placed in racks so that the sheets lie perfectly flat. Rod packings should be left in their respective boxes until actually required for application. This eliminates the possibility of mixup of sizes and styles.

E. L. Spence is packing sales manager, U. S. Rubber Co.

INSTALLING

The correct size packing should be used and rings cut to proper size for each specific application. Stuffing boxes should be thoroughly cleaned after removing all the old packing. Do not insert a new ring or two in back of old rings in a stuffing box, even if the old rings are only slightly worn. It pays to install all new packing. For cold applications, such as water or brine, the rings should be cut to exact size, as little or no expansion will take place in this service. When used against steam or hot water, it is necessary to leave a slight clearance between the ends of the packings to allow for expansion. When rings of large diameter and greater packing space are used greater expansion must be expected from them.

Packings in hot water pumps often cause trouble because of expansion. It is usually necessary during the first few days after a new set of packing is applied to loosen the gland several times until the packing is fully expanded and properly seated in the stuffing box. Pistons on reciprocating pumps handling liquids exceeding 185 deg. F. should be packed with rock hard hydraulic packing rings cut with step joints. This type packing will not swell and bind the pump pistons. Before installing, the rock hard packing should be softened up a little by souk-

ing it in hot water for a few minutes. Where packings are applied to ammonia compressors, a contraction of the packing will occur during "freezebacks," making it necessary to tighten up the gland to prevent leakage. When the heat returns following a "freezeback" the packing expands and the glad must be slackened off to compensate for the expansion, or damage to the packing will result. Most premature failings of packings on ammonia compressors result from neglecting to adjust the packing after a "freezeback." Packing rings should be installed one at a time and each ring firmly tamped into place in the stuff-ing box. Always use rings in stuffing boxes. Do not wind packing around the shaft. All joints should be staggered.

When the stuffing box is filled the gland nuts should be tightened with a wrench to seat the packing properly. The gland nuts should then be slackened off and retightened by hand, giving them a final quarter turn with a wrench. When drawing up a gland care should be taken to pull it up evenly in order to prevent cocking the gland. It is advisable to permit the stuffing box to leak slightly after the new set of packings is installed, as this allows the packing to become properly seated. Packing that is too tight will cause unnecessary friction, power loss and definitely shorten the life of the packing. Careful handling of the packing during the breaking in period pays dividends by preventing scoring, re-ducing friction and eliminating high maintenance costs.

All braided and flexible metallic packings should have butt joints. With the exception of these packings, the best service experience has proven that rings cut with skived joints are more satisfactory for application on recipro-cating pump rods. On inside packed pistons where white hydraulic rings are used, the most successful joint is the mortise or step-cut joint. This joint has given greater satisfaction and longer service than rings with butt joints. When cutting coil or reel packings into rings, the packing should be placed on a clean work bench free from grit, abrasives, etc., as these harsh materials will adhere to the packing and thus be carried into the stuffing box, causing severe cutting action on the rod.

LUBRICATING

Original lubrication will not last indefinitely. Therefore it is necessary to lubricate the rods periodically. Failure to do so will cause the packing to become hard and lose its resiliency, resulting in undue friction, short packing life, and increased operation costs. The most efficient method of renewing lubrication in the packing on centrifugal pump shafts is to provide a lubrication lantern. By this means, oil, grease, or the liquid being pumped can actually be forced into the packing set, permitting a constant supply of lubrication. This method of lubrication is highly effective on pumps handling volatile liquids. In the case of centrifugal pumps handling hot or cold water where no lubrication lantern is used, it is recommended that a small amount of leakage through the packing set be permitted, as water has a good deal of lubrication value.

Additional lubrication should be applied to all rod packings on all surfaces before installation. This will greatly assist the packing during the breaking in period. It is further recommended that the lubrication in packings on reciprocating rods be renewed at regular intervals. This lubrication can be applied mechanically, or with a brush or swab directly to the

During recent years V-shaped packings have been developed principally for use on reciprocating rods and rams They are used to a lesser extent on oscillating shafts and valve stems. This packing is commonly referred to as being automatic. When installing V-shaped type packing the same rules apply as indicated above on other types of rod packings, except that the gland should be pulled up under finger pressure only. Do not use a wrench to tighten the gland as the packing must be more or less free to "breathe" with the pressure changes encountered in pumps and hydraulic presses. When installing packings on such heavy equipment as hydraulic press rams or other vertical units, care must be taken that the heavy gland does not crush the packing. Shims or wedges should be used to prevent the weight of the gland from riding the packing. This will allow for free operation of the packing in the stuffing box and permit the gland to exert an equal pressure on the entire circumference of the packing. The use of shims will prevent cocking of the gland, and prevent unskilled workmen from pulling down too tight on the packing.

CAPPET

Here are a few suggestions which will enable you to obtain longer life from gaskets:

Flanges should be thoroughly cleaned with a wire brush and trued up before gaskets are applied. Gaskets should be cut and centered so that no portion of the inner diameter of the gasket projects into the inner diameter of the line on which the installation

is made. This condition will obstruct the flow through the line with a consequent breakdown of the gasket. Ring type gaskets are generally preferred to full faced gaskets, as it is much easier to compress a ring gasket and thereby obtain a more efficient seal. Where flange faces are smooth and trued up, a h in. or h in. gasket will be found adequate to form an effective seal. Should it be impractical to true up the flange faces, it will be necessary to use a heavier gasket, up to ½ in. in order to compensate for this condition.

Manhole and handhole gaskets should fit the plates snugly and should always be coated with graphite before installing, in order to prevent sticking when it becomes necessary to replace the gasket. Do not use mineral oil. When tightening the bolts or studs after a gasket has been fitted, the flanges should be pulled up evenly by tightening each bolt a little at a time. Alternating from one side of the flange to the other in this manner will insure an even pressure on all parts of the gasket.

PINE GUM PROCESS

Continued from page 199

the gum, the temperature of the pine gum solution should not be allowed to go higher than 75 deg. C. Otherwise, the levo-pimaric acid will isomerize and will not react when the maleic anhydride is added.

Adapting Equipment—Some of the equipment now used in gum processing plants could be used to turn out maleo-pimaric acid.

Gum melters, with the addition of an agitator, could serve as the mixing tank. Gum washing tanks could be used for the settling and crystallization. A resin kettle may be used for the reaction of the gum with maleic anhydride; also, for the distillation of the mother liquor and for making maleic-modified rosin.

Where these pieces of equipment are available, only the centrifuges and a dryer would be needed to equip the plant for the new process.

Residual Rosin—Steam-distilling the solution from which the maleopimaric acid has been removed produces a rosin that's slightly modified by any maleic anhydride not consumed by the reaction. This modified rosin is noncrystallizing; besides, it has a higher acid number and higher softening point than normal rosin. Thus by adding the right amount of maleic anhydride to the mother liquor, a completely maleic-modified rosin (or one modified to any degree the customer wishes) can be turned out.

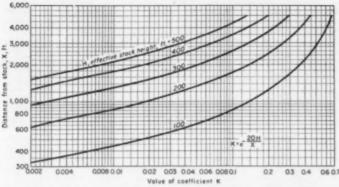


Fig. 2-Chart evaluates coefficient K for use in Eq. (2), which gives ground concentration at any distance from stack, for any stack height and wind velocity.

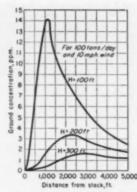


Fig. 3-How ground concentration varies for various stacks.

Stacks for Pollution Control-I

First of three articles on stack heights needed for effective control of pollution by dispersion into the atmosphere. Second article adds refinement of plume height, third discusses particle dispersion.

R. S. STEINBOCK

Public authorities and the public are definitely pollution-conscious today. As a result, industry is continually faced with the problem of eliminating obnoxious contaminants from plant discharges. These, of course, may be solid, liquid or gaseous. In this article attention will be focused entirely on the control of atmospheric pollution. More particularly, we shall deal with air pollution due to gaseous discharges or discharge of gases carrying particles smaller than, say, 1 micron in size.

In applying the methods dealt with here, this limitation of particle size must be borne in mind. However, a tremendous number of problems falls within the scope of this article. In the third part of this article (to be published in a later issue—Ed.) we shall see how to handle the problem of larger air-borne particles, such as fly-ash.

It is obvious that the best solution

R. S. Steindock, in the engineering division of Imperial Oil Ltd. at Sarnia, Ont., is concerned mainly with the development of the company's utility services. He is the author of a number of technical papers including one on insulation thickness in our May 1950

of atmospheric pollution problemsif not necessarily the most economical one-lies in total elimination of obnoxious discharges. Sometimes it may be possible to process certain wastes for byproduct recovery. In other cases it may be necessary to extract the bulk of the pollutants to prevent them from being emitted into the atmosphere. (See for example articles on recovery methods in Chemical Engineering, May 1950.) In most cases, however, a residual amount of pollutant may have to be discharged into the air. This confronts the engineer with the problem of designing a stack or chimney to make sure that the pollutant will be dispersed through a wide enough area to prevent excessive ground concentrations.

Much research has gone into the establishment of safe concentrations of various pollutants. In some localities ordinances govern the permissible concentrations. Where these are absent medical authorities may advise on the safe figure if the pollutant is toxic. But some contaminants may be relatively harmless to humanity, and still be definitely detrimental to plant growth. The nature of the problem and the permissible concentration must therefore be first determined in each individual case.

MAXIMUM GROUND CONCENTRATIONS

If it is merely desired to insure that maximum ground concentration will be limited to a certain figure, then in order to find the required stack height it is necessary only to apply the formula, derived from Eq. (2):

$$C_{Max.} = \frac{12,700 \times M}{V \times H^8} \times \frac{64.06}{\text{mol,wt.}}$$
 (1)

where C mas. = maximum ground concentration, part per million (by volume); M = emission rate of pollutants, tons per day; V = wind velocity, miles per hr; and H = effective stack height, ft. The mol. wt. in the last term refers to the gas in question. For SO₈ the term drops out.

For quick calculations Fig. 1 will give the desired solution. This chart is especially useful if a number of evaluations are necessary to examine the effect of several variables.

Example 1—Sulphur dioxide is emitted at the rate of 20 tons per day through a stack 150 ft. high. What is the resultant maximum ground concentration when V = 10?

Solution—Draw a vertical line from M = 20 down to the curve V = 10 on Fig. 1. Thence proceed horizontally to the curve H = 150 and then vertically down to find $C_{Ros} = 1.1$ ppm. Example 2—With conditions as in

Example (1), what height of stack is required to limit the ground concen-

trations to 0.25 ppm.?

Solution-Draw a vertical line from M = 20 to the curve V = 10 on Fig. 1 as before and note Point (A). Then draw a vertical line from C was. = 0.25. Draw a horizontal line from Point (A) until the vertical line from C was = 0.25 is intersected. The point of intersection gives the required stack height, or H = 325 ft.

CONCENTRATION VARIATIONS

Maximum ground concentration occurs roughly at a distance of ten times the stack height from the stack. (See Fig. 3.) Limiting the maximum concentration to some certain specified figure may require excessively high (and expensive) stacks. Fortunately, this is often unnecessary, since the actual location of the maximum concentration may occur in an area where the limitation of pollution can be relaxed. In many cases we are interested only in protecting a specific zone; hence, smaller stacks may prove adequate. In problems of this type it is useful, or it may even be necessary, to plot the ground concentration at various distances from the stack.

The general concentration equation due to Bosanquet and Pearson (Trans. Faraday Soc., 32, p 1249, 1936), in modified form, states that

$$C = 9.4 \times 10^6 \times \frac{M}{V \times X^6} \times K \qquad (2)$$

where C = ground concentration,

cu. ft. SO, per 10° cu. ft. air; M = emission rate of pollutants, tons per day; V = wind velocity, miles per hr.; X = distance from stack, feet; K = e-mail(x) plotted in Fig. 2; and H = effective height of stack, feet. It will be noted that the term H for height of stack is included in the coefficient K. To convert to another gas than SO, multiply by 64.06/mol. wt. of the gas.

In problems where it is desired to find the stack height of yield a safe concentration at a certain distance from the stack, it is necessary only to calculate K from Eq. (2), after which the stack height can be read

off from Fig. 2.

Example 3—Find the height of the stack if 100 tons of SO, is emitted per day and it is desired to limit the ground concentration to 2 ppm. at a point 500 ft. from the plant, with a wind velocity of 10 mph.

Solution—Solving for K, $K = CVX^{\circ}/(9.4 \times 10^{\circ} \times M)$ or $K = 2 \times 10^{\circ}$ $10 \times 250,000/(9.4 \times 10^{\circ} \times 100) =$ 0.0053. Referring now to Fig. 2, draw a horizontal line from X = 500and a vertical line from K = 0.0053so that the two intersect. Interpolating, read off H = 130 ft.

Example 4-Again with 100 tons of SO, being emitted per day in a wind of 10 mph., plot a ground con-centration curve for points up to 5,000 ft. away from the stack, assuming stacks of 100, 200 and 300 ft. in height.

Solution—In this example both X and K are variable. From Eq. (2):

Rate of emission of pollutants, tons per day Wind velocity For Gos A: 0.02 003 0.05 0.1 0.2 0.3 0.5 1.0 2 3 5 Maximum ground concentration, parts per million 502

Fig. 1—Chart determines maximum ground concentration of sulphur dioxide discharged from stacks of various heights. For other gases see correction.

Values of C for Varying Values of X. K and H

	-H =	100-	-11 -	266-	-11 =	380-
X	K	C	K	C	K	C
500	0.018	6.7		*****	*****	****
780	0.073	11.2	0.005	0.78		****
1.000	0.138	13.9	0.019	1.78	0.003	0.24
1,500	0.255	10.6	0.07	2.83	0.0100	0.77
2,000	0.37	8.7	0.137	3.31	0.05	1.17
3,000	0.51	5.3	0.265	2.84	0.137	1.43
4.000	0.61	3.6	0.37	2.16	0.225	1.39
5,000	0.66	2.5	0.45	1.60	0.3	1.13

 $C = 9.4 \times 10^{\circ} \times (100/10) \times K/X^{\circ}$ $= 9.4 \times 10^{\circ} \times K/X^{\circ}$.

Values of C for varying values of K and H are listed in the accompanying

Values of C are plotted in Fig. 3 against X. From the graph two things are at once apparent: First, the curves rise to a maximum value and then fall. This means that if the area to be safeguarded does not come within the peak range of the concentration curve, a reduction in stack height may be permissible. Second, although there is a marked influence of stack height on the ground concentration at a given point, every successive increase in stack height brings about a diminishing improvement in concentration figures. This shows the need for careful analysis, since unit stack costs increase rapidly with height.

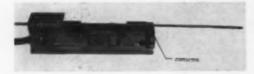
In the foregoing study it is assumed that the actual stack height is the same as the effective height H of the plume. For quick and approximate calculations this assumption may be quite legitimate. However, where a substantial capital expenditure is being considered, a rigorous method should be applied in evaluating H. In this way a reduction in actual stack height

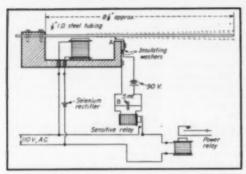
is possible in most cases.

This is because it is not the actual stack height but the effective height to which the plume carries (before it begins to turn downward) that determines the ground concentration. Looked at from this standpoint it is obvious that the higher the plume carries, the lower the stack need be for any required effective height. Although a rather complex set of conditions determines the height of plume carry, in general it depends on (1) the velocity of gases leaving the stack, (2) the difference between their temperature and that of the surrounding atmosphere, and (3) on the rate of change of air temperature with altitude in the atmosphere. Since we can determine the carry under various conditions, it is therefore possible to calculate the actual stack height

A systematic and largely graphical approach to the determination of plume carry and actual stack height will therefore be presented in the second article of this series.

The Plant Notebook Edited by Theodore R. Olive





Vibrating Reed Makes Level Detector For Dry Powders and Liquids

R. D. SPANGLER AND E. B. COOPER, Polychemicals Dept., Research Div., E. I. du Pont de Nemours & Co., Wilmington, Del.

* December Contest Prize Winner

Illustrated above is a device that has been developed as the level detecting element in a system for regulating the feed of a dry powder to maintain a constant level. It operates equally effectively at gas-powder and at gas-liquid interfaces.

Fig. 1 is a photograph and Fig. 2 a schematic drawing of the device. A slender steel tube clamped at one end is set into resonant transverse vibrations at 60 cycles per second by an electromagnet. The vibrating tip of the reed serves as a "feeler."

When vibrating freely, the reed touches contactor A ace each cycle. These brief contacts cause a pulsating once each cycle. current to flow through the sensitive relay. The condenser B stores enough energy during these short intervals to keep the relay closed during the remainder of each cycle. The sensitive relay controls the operation of the power relay which, in turn, controls the feeding mechanism.

When the gas-solid or gas-liquid interface rises suffi-ciently to be "felt" by the tip of the vibrating reed, the amplitude of vibration of the reed is reduced. It no longer touches contactor A each cycle and, therefore, the sensitive relay coil is not energized. The power relay then operates to stop the feeding mechanism until the interface again falls below the tip of the reed.

The vigorous vibration of the reed tends to keep it free of adhered powder or liquid. It also keeps the contacts

at A clean and operative.

The vibrating reed must be carefully tuned to resonance with the driving frequency. This is done by adjusting its length until the amplitude of vibration reaches a maximum. The resonant length depends upon the modulus of elasticity and on the mass per unit length. A steel tube (\frac{1}{2} in. O.D., \frac{1}{2} in. I.D.) was used rather than a solid rod because a long "feeler" was required in the operation for which this device was designed. The steel tube, having less mass per unit length than a solid steel rod of the same diameter, has a greater resonant length.

The purpose of the selenium rectifier shown in Fig. 2 is also to permit the use of a longer reed. Since it allows the alternating current to flow during only one half of each cycle, the reed receives only one half as many impulses per second. By cutting the frequency of the driving force in half the length of reed required for resonance is

The length of the "feeler" may also be increased by causing it to operate at its second, third or even higher harmonic frequencies. Reeds several feet long can be set into vibration at 60 cycles, the nodes and antinodes being clearly visible. However, the sensitivity to damping is much less than when the reed is vibrating in its fundamental frequency

For some applications of level detectors the use of an open electrical contact may be objectionable. The purpose of the contact is to detect vibration of the reed. Other means of detection may be used such as, for example, the reaction on the driving force when the vibration is damped.

Quick Replacement for Broken Heat-Resisting Peepholes

B. Hornung, Consulting Engineer, B. Hornung & Associates, Montevideo, Uruguav.

Sometimes the common heat-resisting glass windows used on process equipment will not stand quick temperature changes and must be replaced. Under the most

★ January Contest Prize Winner

"Simplified Method for Designing Shell-and-Tube Heat Exchangers."

A prize of \$50 in cash will be awarded to G. F. Davis, process engineer, Dominion Tar & Chemical Co., Ltd., Montreal, Canada. Dr. Davis' prize winning article will be published in our March issue.

\$50 PRIZE FOR A GOOD IDEA-Until further notice the Editors of Chemical Engineering will award \$50 cash each month to the author of the best short article received that month and accepted for publication in the Plant Notebook. Each month's winner will be announced the following month and published the second following month.

\$100 ANNUAL PRIZE-At the end of each year the monthly winners will be rejudged to determine the year's best Plant Notebook article, which will then be awarded an additional \$100 prize.

HOW TO ENTER CONTEST-Any reader of Chemical Engineering, other than

a McGraw-Hill employee, may submit as many entries for this contest as he wishes. Acceptable material must be previously unpublished and should be short, preferably not over 500 words, but illustrated if possible. Articles which are acceptable but are not winners will be published at regular space rates (\$10 minimum).

Articles may deal with plant or produc-tion "kinks," or novel means of present-ing useful data, which will interest chemical engineers. Address Plant Notebook Editor, Chemical Engineering, 330 West 42nd St., New York 36, N. Y. severe conditions a quartz peephole may be the only recourse, but these are not only small and expensive, but are sometimes hard to secure on short order. In such a case a good substitute can be made from the blue borosilicate glass used for kitchenware. The bottom can easily be cut from a flameware Pyrex brand saucepan, and ground to size with a wet stone. Usually this permits using a bigger window than with other materials.

In designing such a closure, of course, it is necessary to consider the pressure under which it will operate. It is also necessary to keep in mind that it is the metal frame, rather than the glass, which expands and contracts with

changes in temperature.

Splitter Boxes Can Be Built to Work Without Splash

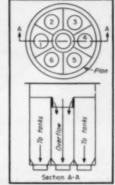
Ina A. Butchen, Consulting Engineer, Cincinnati 11, Ohio.

Many people seem to think any old box is good enough for a splitter box, building them shallow and with flat bottoms. The result is that the liquid splashes all over the floor, and the operator too. This can easily be avoided by giving a little attention to the design of the bottom of the box.

The accompanying plan and section show a multiple outlet box having six process tank outlets and an overflow.

By building each compartment with a cone bottom, the only splash which occurs is while passing the filling hose across partitions. Even

this can be avoided by shutting off the flow while making the switch. The cone bottom should make a slope of about 30 deg. with the vertical.



Important Notice

Effective with this issue, rates for payments to authors of material published in the Plant Notebook will be increased as

Plant Notebook Contest — As at present, winners of the monthly Plant Notebook Contests will continue to receive a cash prize of \$50 for each winning article. However, each winner will have an opportunity to win an additional prize of \$100, or a total of \$150 for his winning contribution. Here is how it works: At the end of each year, as long as these rules remain in force, the winning articles published in each of the 12 months of the year will automatically be entered in an annual contest for which, as in the case of the monthly contests, the editors of Chemical Engineering will be the judges. The judges will select from among the 12 winners the one article which their opinion is the year's best. The author of this article will then receive an additional prize of \$100. His name will be announced in the first issue after the annual contest judging, i.e., in the January 1953 issue in the case of the 1952 annual contest.

Plant Notebook Space Rates-Articles published in the Plant Notebook, other than the contest winners, will be paid for at space rates 40 percent higher than those of 1951. A new minimum rate is established at \$10-that is, each author will receive at least \$10 for his published article, no matter how short it may be.



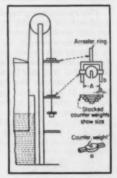
Protect Insulation Where Needed

You can't expect thermal insulation to stand up against repeated mechanical abuse. This simple fact is often overlooked, according to the Magnesia Insulation Manufacturers Assn. An example is the common case, shown above, where a covered pipe spans a walk-way. The cure is simple, as the photo shows. Merely serew, belt or tackweld a sheet metal jacket around the pipe, covering the entire area of possible damage. If necessary it is easy to provide an expansion joint in the metal shield by using spring-loaded bolts to hold it together. For longitudinal expansion, provide slip joints about every 12 ft.

Simple Automatic Method for Balancing Gas Holders

ARVIND M. DESAI, National Chemical Laboratory, Poona, India.

In the common type of gas holder it is customary to balance the weight of the float by means of counterweights from suspended cables attached to the float itself. Since the gas stored inside the gas holder has a tendency to buoy up the float, the apparent weight of the latter changes with the total quantity of gas stored. Consequently the number of counterweights required for balancing must be changed depending on the position of the float with respect to the water level in the holder.



Usually it is necessary for the operator to check periodically and make suitable adjustments.

There is a simple way, shown in the sketch, for making

the addition or subtraction of the counterweights automatic with movements of the float. As the float rises, weights are removed; as it falls, weights are added. All that is required is to modify the weights by welding on lugs as shown in detail (a); and by mounting arrester rings, shown at (b), on the vertical column which carries the pulley. The location of the arrester rings and the dimensions A and B depend on the total weight of the float and the actual size of the counterweights. These can be figured out easily in any given case. Two or three arrester rings should be enough for most holders. This simple modification can be incorporated readily in any existing set-up and will help to maintain constant line pressure without difficulty.

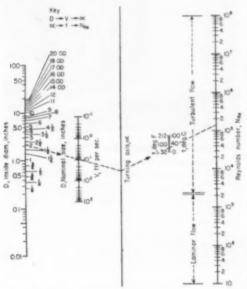


Chart Gives Quick Reynolds Numbers for Water

JACK LOWENSTEIN, Chemical Corps Engineering Agency, Army Chemical Center, Md.

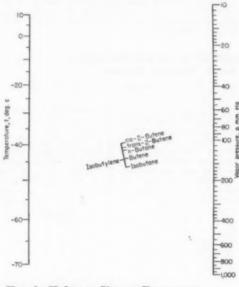
The nomograph presented here gives a quick approximation of the Reynolds number for water at temperatures between the freezing and boiling points. To use it, it is only necessary to know the inside diameter of the pipe or its nominal size, the velocity of flow through the pipe, and the temperature of the water. Note however that the chart can be used only for water.

In the customary form of the Reynolds number, $N_{a_0} = DV_0/\mu$, D is the actual inside diameter of the pipe; V is the flow velocity; ϱ is the fluid density at the existing temperature; and μ is the viscosity of the fluid in absolute units. Although it is not difficult to calculate the Reynolds number, it means looking up the properties of the fluid and conversion to proper units, which is likely to be time

Examining the form of the expression for the Reynolds number it is clear that the ratio ρ/μ is the only part of the expression that depends on the properties of the fluid. The nomograph was constructed so as to put this ratio into the equation, for water at various temperatures, by

means of the next to the last scale, or temperature scale, at the right.

Use of the chart is easy. Simply connect a straight line from the inside pipe diameter through the required velocity of flow to the turning axis, a. From this point extend a straight line through the temperature to the required Reynolds number. For example, if the pipe is nominal 2 in., the flow rate is 10 fps. and the temperature is 60 deg. F., then the Reynolds number is 150,000.



Here's Help on Vapor Pressures Of Butanes and Butenes

D. S. Davis, Professor of Chemical Engineering, Virginia Polytechnic Institute, Blacksburg, Va.

Since the various butanes and butenes play important parts in many alkylations and polymerizations, convenient estimation of their vapor pressures is desirable. Vapor pressures and boiling points can be read easily from the accompanying line coordinate chart, which is based on the data of Wackher, Linn and Grosse and is dependent on the general equation

$$\log p = A - \frac{B}{t + 220}$$

where p = vapor pressure, mm. of mercury; t = temperature, deg. C; and A and B are specific to the compound.

The chart was constructed by methods described previously' and its use is illustrated as follows: What is the vapor pressure of n-butane at -30 deg. C.? Connect -30 on the t scale with the point on the central axis for n-butane and read the vapor pressure at 220 mm. of mercury on the p scale. What is the boiling point of butene? Connect 760 on the p scale with the point for butene on the central axis and read the desired value as -7 deg. C. on the t scale.

REFERENCES

 Davis, D. S., "Empirical Equations and Nomography," Chap. IX, McGraw-Hill Book Co., New York, 1943.
 Wackher, R. C., Linn, C. B. and Grosse, A. V., Ind. Bng. Chem., 37, 464 (1945).

FLEXIBLE STANDARDS



Pfaudler Data Book to help you save time on heat exchanger calculations

This 40-page, fact-packed manual is designed to help you solve heat exchanger problems. Contains all the data you need to work out capacity and type—arranged in easy-to-follow tables, curves and charts. Full details on Pfaudler heat exchangers. It's a basic working handbook which no one concerned with heat exchange should be without. Just mail the handy coupon for your copy.

Design features previously associated only with custom-built heat exchangers are now available at competitive standard cost under Pfaudler's new system of flexible standards.

For a given heat transfer area, you may select the most applicable combination of length and diameter. Further, nozzles can be of any size and in any position and can be either threaded or flanged. This flexible standards program applies to fixed tube sheet, single or multi-pass, tube and/or shell side stainless steel units in diameters up to 10".

RAPID DELIVERY through Production Line Methods

Under present conditions, flexible standard units can be delivered in from 4 to 12 weeks after the receipt of your order, always considering first our obligations under our country's allocation and ratings programs. Fastest deliveries are obtainable in the smaller sizes (4½" to 6"). These rapid deliveries are possible because we carry a stock of tube sheets, bonnets, nozzles, tubes, baffles, etc., ready for assembly to your specifications.

Pfaudler

THE PFAUDLER CO., ROCHESTER 3, N.Y.

ENGINEERS AND FABRICATORS OF CORROSION RESISTANT PROCESS EQUIPMENT

GLASS-LINED STEEL—Hastelloy • Aluminum • Tantalum • Teflon Carbon Steel • Solid or Clad Stainless Steel • Nickel • Inconel • Monel

THE PFAUDLER CO., Dept. CE2, Rochester 3, N. Y.

Please send me the Pfaudler Heat Exchanger Manual

.

Title

Сотовну

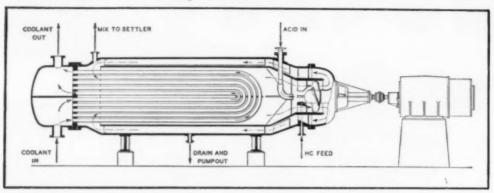
Address

City_

Your State

Process Equipment News Edited by Cocil H. Chillion

NEW PROCESSING EQUIPMENT



Alkylation Contactor is Improved and Modified

RAPID MIXING in this unit shortens cycle times in grease manufacture.

New tube bundle increases heat-transfer capacity. Modified designs find uses in new fields.

(208A) The Stratco contactor, widely used for production of aviation gasoline by alkylation during World War II, has undergone recent modifications and adaptations which may suggest interesting possibilities for chemical industry applications.

This device consists essentially of a cylindrical chamber fitted internally with a smaller cylinder in the form of a draft tube. A rotating axial-flow impeller at one end of the draft tube induces high-velocity circulation of liquids through the draft tube and propels them back through the annulus. For exothernic reactions, cooling is provided by a tube bundle occupying as much of the volume of the draft tube as is practical.

Mixing action of the impeller and turbulent flow through the unit promote intimate contact of immiscible liquids or of liquids with solids or gases. High velocity past the cooling surface gives good heat-transfer coefficients, even with hydrocarbon-sulphuric acid emulsions.

This rapid heat-transfer rate has led to one of the recent changes in design. The first commercial contactor involved a jump in size from a pilot plant of about 2 bbl. per day to 500 bbl. per day. Little was known at the time about the heat-transfer characteristics of the emulsion, but it was feared that the film coefficient would

be low. It was known, on the other hand, that the coefficient on the coolant side of the tubes was very high, and logic dietated that finned tubes be

In actual experience, the outside film coefficient was much higher than anticipated. This meant that the same number of bare tubes would transfer nearly as much heat as the finned tubes. And since more bare tubes could be packed into the same space, increased cooling capacities were possible. For example, the Size 30 contactor was originally equipped with finned tubes having a total surface of 4,800 sq. ft. and an over-all coefficient of 25 for water cooling. The newly developed tube bundle provides only 4,100 sq. ft., but it is all prime surface and gives an over-all coefficient of 90.

Another improvement is horizontal instead of vertical mounting. This change saves appreciably on structural supports and eliminates gearing by permitting in-line drive.

This type of contactor is being used, in addition to alkylation of hydrocarbons, for the alkylation of cresols and the polymerization of isobutylene with AlCl_a catalyst.

An adaptation of the alkylation contactor has been applied to grease manufacture. For this service the tube bundle is absent, being replaced by jackets in both the draft tube wall and

the outer wall. For grease manufacture, heat-transfer capacity is not critical, and substitution of the jackets for the bundle permits easy cleaning of the unit. Also, the pressure drop of the circulating stream is much less, and the machine can handle more viscous materials.

The Stratco contactor was originally designed with horizontal draft tube and shell of small volumetric capacity but with no cooling elements. This basic unit is still manufactured in a number of sizes for use where a high degree of mixing is required with minimum residence time. It is being used for acid-treating and neutralization of hydrocarbons, saponification, manufacture of sulphonic acids and the conversion of sulphonic acids to sulphonates.-Stratford Engineering Corp.

Grinding Mill Uses Recirculation

(209A)The Szegvari Attritor, a device for fine grinding and dispersions, is now equipped to withdraw slurry from the bottom of the tank and pump it back in at the top. This recirculation is said to increase the speed of grinding and improve the quality.

The Attritor consists essentially of a vertical tank provided with a set of powerful agitator arms. The tank is loaded with pebbles, like a conventional pebble mill, but the tank remains stationary while the agitator arms roll the pebbles around. The material to be ground, in the form of a slurry, occupies the voids between the pebbles.-Union Process Co.



Air Diffuser Is Easily Cleaned

The new Colaflex air diffuser, useful in absorption operations, can be easily cleaned to maintain practically constant permeability. The diffusing element is made of

IN BRIEF-A completed listing of this w

Processing Equipment	Page
Alkylation Contactor Grinding Mill Air Diffuser Bag Filters Pressure Filter Agitator Drive	Improved and modified for greater versatility. 208A Recirculation increases grinding speed. 209A Fabric element is easily cleaned. 209E Simple design makes for low cost. 210A Air sluicing discharges dry cake. 210E High-shear mixing action for viscous ma- terials 210C
Portable Ion Exchanger Vapor Purifier Tower Packing	Recovers contaminated chrome plating baths. 210D Removes extrainment in stills and towers 210E Non-symmetrical saddle offers more surface 210F
Packaging and Handling Equip-	ment

racrating was managing ride	
Ampule Washer	Centrifugal force is put to work
Hopper Car Unloader	Uses belt conveyor for handling abrasive
Storage Cabinet	Holds 100 radioactive samples
Bin Level Indicator	Central mounting ideal for large bins
Mobile Electric Crane	Telescoping boom extends to 19 ft
Gas-Powered Trucks	Two models powered by 3-cylinder engines 212F
Conveyor Section	Converging section for all roller conveyors 2120
Platform Adapter	Converts pallet truck into platform truck 212H
Rollover Clamp	Dumps skid boxes with rotating head2121

Materials of Construction News Abrasive Pump Parts

Plastic Pipe Plastic Truck	Produced by continuous extrusion
iew Safety Equipment	
safety Valve	Permits metal drums to breathe
ombustible Gas Alarm	Can be installed in suspected atmosphere216B
inyl-Coated Gloves	Resist acids, solvents and abrasion216C
orion Work Clothing	Available as shirts, trousers, coveralls, etc 216D
Emergency Lights	Turn on when power supply fails
aminating Press	Applies plastic covers to passes and photos216F
A STATE OF THE PARTY OF THE PAR	Y and the bear managed amounth ordered tree 91662

Heating and Cooling Equipment Induction Heater

Induction Heater Packaged Steam Generator Heating Tape Cooling Tower	Can be quickly opened for cleaning
Fluids Handling Equipment	
Relief Valve	Controls at 7 to 10 psi
Aluminum Tubing	Combines low cost and easy workability 218F
High-Pressure Pumps	Simple design lowers maintenance costs218G
Positive Displacement Pump	Tefion impeller handles most corrosive fluids 218H
Excess Flow Valve	Throttling type disk eliminates chatter
Bellows Connector	Overcomes vibration and corrosion219B
Globe Valve	Extremely compact for high pressures 221A
Welding Fittings	Added thickness at all areas of stress221B
Charles Charle Walnut	Destroit against appropriate populat 9910

High-Pressure Pumps
Positive Displacement Pump
Excess Flow Valve Bellows Connector Welding Fittings Compressor Check Valve Sight-Flow Indicator

Instruments and Controls Rotameter Floats Liquid Level Gage Electronic Computer pH Meter Beta-Ray Gage Cos Recorder
Automatic Weighing System
Program Control

Vacuum Tube Voltmeter Thickness Gage Refractometer

Silicon carbide and aluminum oxide resist

Individual units can be removed and replaced . 218A

Mechanical Shaft Seal	For higher pressures, temperatures and speeds . 226/
Drafting Tool	Many instruments in one2261
Small Gas Turbine	Drives emergency 250-kw. generator2260
Packing Glands	For small stuffing boxes or static seals
Speed Reducers	New series of vertical worm gear units2271
Multi-Stage Turbines	Four designs up to 5,000 hp
Indicating Starter	Lights show whether on or off
Variable Speed Drive	Motordrive up to 25 hp
Welding Machine	With high-velocity air-cooling of stacks2271

Don't Forget: Reader service postcard inside back cover will bring you more information. Use these key numbers —

fabric. Gas under pressure inflates the element to an erect, distended position and diffuses through the fabric into the liquid phase. All you do to clean the fabric is shut off the gas

supply, using a 3-way valve, and the fabric is collapsed by the hydrostatic head of the liquid. This dislodges solid particles that may have accumulated on or in the fabric.-Infilco Inc.



Bag Filters At Low Cost

(210A) Simplicity of design of a new bag filter provides dust control at a low installed cost. These units range from 5 to 40 ft. long, contain 1,360 to 11,000 sq. ft. of filter cloth, employ 1 to 6 hoppers, and are supplied with appropriate structural supports.

Bags are fastened, open end down, by wing-nuts to suspension members. Each bag has a rubber hem at the open end to achieve dust-tight fitting of bags to grid plate. Dust collected in the bags is removed by shutting down the exhauster and turning on the shaker motor.—Pangborn Corp.

Pressure Filter Discharges Bry Cake

(210B) For filtration jobs which require discharge of dry cake, a new pressure leaf filter uses an air jet sluicing device to remove the cake. This device operates on a principle similar to that used when sluicing with water, except that high-velocity air nozzles replace the water nozzles. The leaf design is modified by placing the outlet nozzles on the side of the leaf so as to present no obstruction and allow the cake to fall free.

The filter tank bottom is arranged for quick opening, like the tank cover on conventional pressure leaf filters. At the completion of the filtration cycle, you drain any liquid heel back to storage, open the bottom, and turn on the air jets. Where the cake is tenacious, you can use vibrators to help discharge the cake. In either case, pre-drying in place on the filter leaves with air or inert gas is suggested.

These filters are furnished in capacities ranging from 24 to 550 sq. ft., with bolted or quick-opening tank closures. Filter tanks and leaves can be made in all common materials of

construction, such as steel, stainless steel, Monel and nickel.—Enzinger Union Corp.



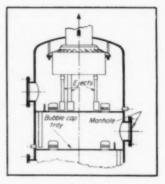
Agitator Brive For Viscous Materials

(210C) A new line of doublemotion agitator drives is designed to provide efficient mixing of viscous, sluggish materials. These drives, working with paddle stirrers, produce a high-shear mixing action throughout the vessel.

The drives are ruggedly built, incorporating bevel gears operating in an oil bath. An oil-trap housing design climinates the need for a stuffing box on the main shaft. Claimed to be leak-proof, the drives are fully enclosed to seal out fumes, duct and moisture from the mechanism. They are available in sizes to 25 hp.—New England Tank & Tower Co.



PORTABLE ION EXCHANGER (210D) This unit permits recovery of contaminated chrome plating baths which otherwise would have to be discarded. It is made in four standard sizes, in stationary as well as portable models.—Illinois Water Treatment Co.



Internal Vapor Purifier Knocks Down Entrainment

(210E) The Hi-ef internal vapor purifier is designed to remove entrainment from vapors inside steam drums, flash tanks, evaporators, stills, and fractionating towers (see cut). Containing no moving parts, it is claimed to operate with a low pressure drop and to occupy a minimum of space.

Entrainment-laden vapor enters the top of the purifier and passes downward in a rotary motion. Centrifugal force removes the greater portion of the entrainment. In the second stage of separation, the rapid rotation is reduced to slow linear flow, and the last stage again uses centrifugal force. Entrainment removed from the vapor is discharged below the liquid level.

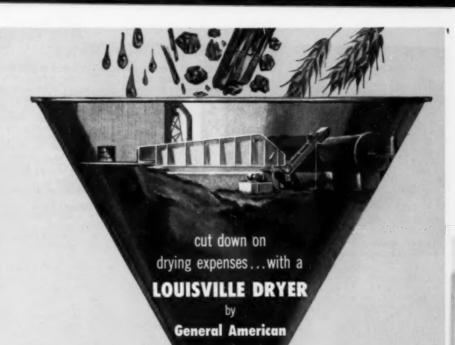
Hi-ef purifiers are made in sizes from 4 in. to 72 in., in steel, stainless steel, and other alloys.—V. D. Anderson Co.

Tower Packing Provides More Surface

(210F) A new ceramic tower packing, known as the Intalox saddle, is made in a non-symmetrical, irregular shape so that no two pieces will fit exactly into each other. This absence of nesting makes the surface almost completely available to the gases and liquids in a tower.

Greater free space means higher capacity and lower pressure drop. Test results show a pressure drop 60 to 65 percent lower than Raschig rings and 30 percent lower than Berl saddles.

Intalox packing is available in nominal sizes of \(\frac{1}{2}, \frac{3}{4}\), 1 and 1\(\frac{1}{2}\) in. Free space for all sizes runs about 75 percent. Surface areas range from 168 sq. ft. per cu. ft. for the \(\frac{1}{2}\)-in. size down to 57 for the 1-in. size.—U. S. Stoneware Co.





Louisville Rotary Cooler with rotary shell and external water sprays.



Louisville Rotary Steam-Tube Dryer —indirect type using steam as heating medium, and utilizing 85% of that steam for useful work.

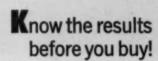
There is a LOUISVILLE DRYER for better drying in the following industries: Brewing • Conners By-Products Chemical • Distilling • Fertilizer • Fisheries • Feeds • Foods Alining • Pocking House Products • Wood Products



LOUISVILLE DRYING MACHINERY UNIT

GENERAL AMERICAN TRANSPORTATION CORPORATION

General Officer 135 South LaSalle Street, Chicago 90, Illinois Dryer Soles Office: 139 S. Fourth Street, Louisville 2, Kennusky OFFICES IN ALL PRINCIPAL CITIES



A Louisville engineer can tell you every saving, every improvement, every hit of increased efficiency before you invest. A Louisville Dryer is fitted to your job. It's the result of a Louisville engineer's complete analysis of your particular problem, of knossing your problem thoroughly... and solving it by applying 50 years of drying experience, and using the testing facilities of General American's laboratories.

More than once, a Louisville Dryer has turned a losing operation into a profitable one. Write or call for a Louisville engineer to make an obligation-free survey of your operation.

NEW PACKAGING & HANDLING EQUIPMENT



Ampule Washer Uses Centrifugal Force

(212A) Washing and drying ampules can now be done rapidly in a centrifugal. The ampules are placed in racks which are fitted into boxes; the boxes are placed in the machine, which is filled with detergent solution, facing the open ends of the ampules toward the center of the machine. As the centrifugal spins, the force developed assures thorough cleansing of the inside of the ampules.

To drain and spin dry, the boxes are reversed so that the open ends face away from the center. Centrifugal force then slings the liquid away from the ampules. For rinsing, these operations are repeated, using clear water.

Rates of washing of nearly 8,000 l-cc. ampules per hr. are possible with this method; other sizes of ampules up to 20 cc. car. be handled. The machine can also be used to wash vials of up to 60 cc. capacity.—Baltimore Biological Laboratory, Inc.

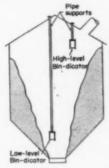
Hopper Car Unloader Conveys Via Belt

(212B) Available in widths of 24 and 30 in., a new hopper car unloader uses a belt conveyor, eliminating all chains. This machine is especially well suited for handling highly abrasive materials. All axles ride on anti-friction bearings, including wheels, idlers, hold-down rollers and pulleys.—Lippmann Engineering Works.

Storage Cabinet For Radioactive Samples

(212C) The new Model N4 storage cabinet for radioactive samples is provided with ten drawers, each containing ten sample holders. A major feature of this cabinet is the provision for replacing sample holders in case of contamination. Sample holders are

plastic cups which are pressed into holes in the tray. If contamination occurs, these cups are easily replaced at little cost.—Nuclear Instrument & Chemical Corp.



Bin Level Indicator Can Be Located Centrally

(212D) A new bin level indicator solves the problem of securing dependable level indication in large bins holding materials which tend to build up on the walls, flowing down through the central area only. Under such conditions, indicators mounted on the wall cannot function properly. The new Model CS Bin-Dicator, however, being centrally mounted in the area of moving material, gives depend-

able indication of high and low levels.

The unit is designed to be drilled and tapped to take any size pipe up to 2 in. The support pipe also accommodates electrical wiring, making conduit unnecessary. Because of the manner of mounting, the installation can be easily moved up or down in the bin to operate at different levels or lifted out for inspection.—The Bin-Dicator Co.

Packaging & Handling Briefs

Gas-Powered Trucks—Two new standup models with 3,000 and 3,500 lb. capacities. Powered by 3-cylinder air-cooled gas engine. Mobilift Corp. (212F)

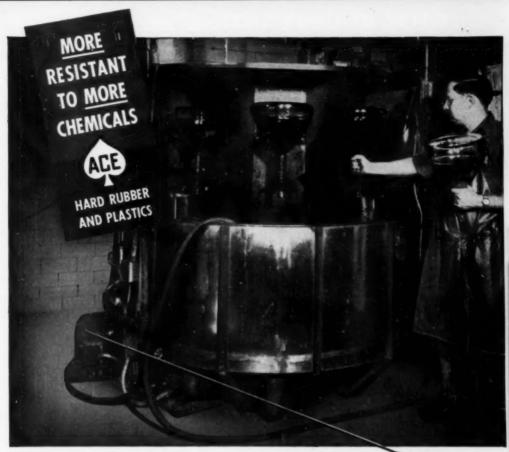
Conveyor Section—Converging section for all roller conveyors from 6 to 36 in. wide. Sage Equipment Co. (212G)

Platform Adapter—Converts pallet truck into platform truck, making it possible to handle platforms, skids and tote boxes. Towmotor Corp. (212H)

Rollover Clamp—Fork truck attachment; handles pallet loads on the forks, dumps skid boxes with the rotating head, uses the forks as clamps for handling miscellaneous objects. Baker-Raulang Co. (2121)



MOBILE CRANE HANDLES LOADS TO 5 TONS
(212E) With a telescoping boom providing lengths of from 12 to 19 ft., this electric-powered mobile-crane is rated at 10,000 lb. capacity at 5½ ft. radius. With the boom fully extended, you can get a hook height of 18 ft.—Elwell-Parker Electric Co.



HYDROFLUORIC ACID EYEWASH for Television Tubes – pumped by ACE Hard Rubber

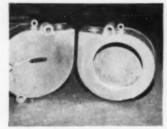
THIS special machine for washing television tubes uses 12% hydrofluoric acid as the cleansing reagent. The job of handling this tough corrosive was given to four ACE hard rubber pumps.

The remarkable part of this story is not that ACE stands up under hydro-

fluoric acid; that's commonplace! But the fact that the pumps are constantly switched on and off—twice a minute, 24 hours a day, six days a week—is remarkable. What better test could you devise for a well built acid pump?

We can supply you with rubber-protected tanks, pumps, piping, valves, fittings, and utensils in standard or special constructions for complete chemical processing, storage, or circulating systems. Saran and Parian (polyethylene) pipe and fittings are also available. Write for "ACE Rubber Protection"—64 pages of catalog data you'll find valuable in your work.







SILICON CARBIDE centrifugal pump casings and impellers.





ALUMINUM OXIDE sleeve bearing and cylinder liners.

Abrasives Resist Abrasion

Silicon carbide and aluminum oxide pump parts show long lives when handling slurries.

Recent laboratory and field tests have demonstrated that the life of centrifugal pump parts, particularly those handling slurries and subjected to abrasion, can be increased many times by making the parts of silicon carbide. A parallel develop-ment is the use of aluminum oxide for lining submerged sleeve bearings and cylinders of reciprocating pumps.

Hardness of these wear-resistant materials isn't their only attractive feature for chemical services-they are inert to most chemicals, have a very high melting point, are dimensionally stable, and, surprisingly, have a low coefficient of friction.

This latter property, plus ability to take a high polish, explains the use of aluminum oxide for bearings and cylinder liners. Aluminum oxide liners in bronze casings are used for cylinders in reciprocating pumps handling salt water for repressuring oil wells. Corrosion and abrasion resistance of the liner have increased pump life more than 20-fold. Aluminum oxide sleeve bearings are successfully used with submerged vertical centrifugal pumps where no lubricant is available

other than the liquid being pumped.

Silicon carbide pumps have been tested extensively at the St. Joseph Lead Co.'s zinc mine at Balmat, N. Y. Impellers of SiC have outlasted alloy impellers by as much as 9 to 1. Similar results have been obtained with SiC-lined pump casings.

Such results suggest possible other uses for these materials in chemical process applications. Some of these are: liners for check valves and plug cocks, mechanical seal faces, nozzles and orifice plates. For construction of wear-resistant nozzles, still another synthetic material, boron carbide, has found successful applications. Boron carbide, incidentally, is the hardest material made by man, outwearing even silicon carbide nozzles in severe services.-Norton Co.

Tenite Fittings In Small Sizes

If our story on Tenite pipe in January (p. 190) suggested any applications which you would like to try on a small scale, you might be able to use some clear Tenite valves and

fittings developed primarily for aqua-rium hobbyists. These are made with in. I.D. and &in. O.D., although larger sizes can be made to orde.. You can get two-way and three-way valves, tees and crosses.-Thor Han-



Plastic Pine Via Continuous Extrusion

Polydur 162 is said by its manufacturer to be the first nonplasticized polyvinyl chloride pipe produced in this country by continuous extrusion methods. It is made with extra-heavy walls in sizes up to and including 2 in. Standard lengths of 10 or 25 ft. can be furnished, with plain or flanged ends.

In addition to the corrosion resistance common to vinyl resins, Polydur has a high impact strength, even at sub-zero temperatures. It can be machined, welded, threaded and even formed by heating it above 250 deg. F. -Munray Products, Inc.



Plastic Truck Molded in One Piece

One-piece molding of this Fiberglas-plastic truck eliminates the need for rivets, bolts, nuts, screws and other fastening devices. In addi-tion, all horizontal and vertical corners have gently curved radiuses. These features make this truck ideal for handling delicate materials, such as varns and fabrics.-Laminex Corp.

How to get better results with



CHECK THE AGITATOR. Does it draw a vortex like this? If so, solid particles may be heavily concentrated in tank bottom. This can mean time loss and power waste. It can cause overloading or damage to filters, pumps, other connected units in the system.



VORTEX IS ELIMINATED by properly baffling the tank, and by choosing an impeller that will efficiently lift particles of given size, density and settling rate. Result: you get the kind of suspension you want, with less horsepower, in minimum time. Mixco can help you get better results on any fluid agitation job-often in much less time and with less installed horsepower than you are now using, or plan to use.

In fluid agitation, remember these two facts:

- Mixco engineers give you accurate prediction of results.
- •LIGHTNIN MIXERS are guaranteed to do the job right.



THREE 10-HP LIGHTNIN MIXERS agitating a slurry in large

"Lightnin Mixers...

for every fluid agitation job

fluid agitation specialists

EVERY LIGHTNIN MIXER IS GUARANTEED TO DO THE JOB RIGHT



PORTABLE



SIDE ENTERING 1 to 50 HP



TOP ENTERING

_______ MIXING EQUIPMENT Co., Inc.

128 Mt. Read Blvd., Rochester 11, N. Y.

In Canada: William & J. G. Greey, Ltd., Terente

Please send me the bulletins checked:

- ☐ B-102 Top Entering Mixers ☐ B-100 Condensed Catalog (turbine and paddle types)
 - (complete line)
- ☐ 8-78 Top Entering Mixers ☐ 8-75 Portable Mixers

- ☐ 8-76 Side Entering Mixers ☐ DH-50 Laboratory Mixers

Compony

Address_

Zone State...



Safety Valve Protects Metal Brums

(216A) The new Ventadrum safety valve protects metal drums by permitting them to breathe with expansion and contraction. Weighing less than 2 lb. and measuring approximately 3½ in. high, it is easily screwed into the bung opening of standard

50-gal, drums.

The Ventadrum permits air to enter the drum on contraction of the liquid or while liquid is being withdrawn, eliminating the need for leaving the bung open. It also permits air to escape slowly during expansion of the liquid caused by normal temperature changes. In the event of a quick temperature change, such as a nearby fire, the Ventadrum opens to relieve the built-up pressure. It automatically reseats and shuts off when the pressure has been relieved. Integral fire screens keep fire out of the drum.

If the drum should turn over, the Ventadrum automatically seals itself.
—Central Safety Equipment Co.



Combustible Gas Alarm Is Explosion-Proof

(216B) Because of its completely explosion-proof construction, this new Model EE combustible gas

alarm can be installed directly in the suspected atmosphere. Presence of combustible vapor is signalled by indicator lights and remote alarm units of various types. While the alarm point is usually established at 20 percent of the lower explosive limit, other values can be provided where required.—

Johnson-Williams Ltd.

Vinyl-Coated Gloves Resist Acids and Abrasion

(216C) A new line of canvas work gloves has a protective coating of Vinylite resins that resists acids, solvents and abrasion. These gloves will outwear ordinary gloves, the manufacturer claims, and the resin coating provides the added feature of a non-slip grip. They are available in both gauntlet and knit-wrist styles.—Tillotson Rubber Co.

Work Clothing Made From Orlon

(216D) Orlon acrylic fiber is now being made into chemically resistant work clothing. Garments available are shirts, trousers, coveralls, lab coats, jackets, aprons, caps, wom-

en's slacks and dresses. These garments can be

These garments can be treated with Zelan, if desired, which repels or retards the penetration of liquids through the fabric. This feature provides an additional measure of safety to the wearer, allowing him to reach a deluge shower or to remove the garment before injury can result from penetration through the fabric. With minor sprays or splashes, the liquids merely roll off the Zelan-treated fabrics without harming the wearer or damaging the fabric.—Worklon, Inc.

Emergency Lights For Power Failures

(216E) A new line of automatic emergency lights automatically turn on instantly when the normal power supply fails. Placed in strategic or critical locations, they eliminate the hazard associated with sudden darkness caused by unexpected power failure.

The automatic feature is accomplished by means of a special circuit plugged into the unit, consisting of a magnetic device developed for this service. The lights themselves, of course, are battery-operated. The new line includes both lantern and portable flashlight styles.—Uni-Ventions Co.



Laminating Press Applies Plastic Protection

(216F) Permanent plastic protection of identification passes and photos can be accomplished with this new laminating press, which can be set up in any office and operated by regular office personnel. Complete lamination of material up to 5 by 6 in. can be done in 45 sec., with multiple production of wallet-size units requiring 22 sec. each.—Harco Industries.

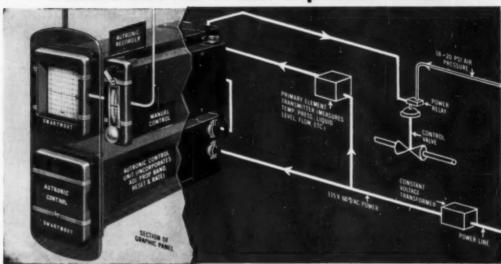


Identification System Uses Locked-In Key

(216G) A new method of controlled identification has been developed for the purpose of identifying authorized personnel quickly and positively. Among other advantages, positioning a station at points where employees punch time cards will eliminate the possibility of any worker's punching cards of other employees.

Identification card or plate systems are subject to easy unauthorized use if lost or stolen, because their reading matter is visible. The new system, with locked-in key, overcomes this objection because it can be decoded only by a machine at the proper point of presentation.—Authorite Co.

Miniature all-electronic system for instantaneous measurement and control of process variables . . .





Regardless how fast a pneumatic or electro-mechanical system may function, it cannot compare with the instantaneous, all-electronic response of the Swartwout Autronic Control System. Here's why. Since transmission of information throughout the system is by electrical means only, there is no mechanical motion . . . no slide wires, boosters or motors to initiate control action . . . no control air lines from primary element or to final element. Hence the Autronic Control System spans distance between primary and final elements without interval —for closer, more accurate control.



2 AUTRONIC CONTROLLER, heart of the system, has no moving parts. Proportion, reset and rate-action adjustments; with or without built-in set-point adjustment. Extremely compact, plug-in type units are interchangeable; can be used direct or reverse-acting.



3 AUTRONIC RECORDER operates without slide wires or other contacting mechanisms. Electronically controlled pen gives true linear trace. Unit holds 1-month supply of standard 3-inch linear or square root chart paper. Set-point adjustment optional with Autronic Recorder.



4 AUTRONIC MANUAL CONTROL makes bumpless changeovers simple. No gauges to synchronize, no readings to remember because indicator shows difference between actual and desired output.

Swartwout Autronic CONTROL SYSTEM

SEND FOR BULLETIN A.701 - THE SWARTWOUT COMPANY - 18511 EUCLID AVENUE - CLEVELAND 12, ONIO

NEW HEATING & COOLING EQUIPMENT



Induction Heater Uses Multiple Units

(218A) This new induction heating assembly resembles a filing cabinet in more than just appearance. Individual units can be removed and replaced, just like the drawers of a filing cabinet. Each unit is rated at 2½ kw.—Induction Heating Corp.

Packaged Steam Generator Can Be Easily Cleaned

(218B) An interesting feature of the new Continental packaged steam generator is that front and back can se opened in 15 to 20 min., providing ready access for interior cleaning and servicing. In addition, this unit is said to be fully automatic, self-

contained, easy to install, efficient and conomical to operate.

This generator can be used with heavy oil, light oil, gas or a combination of fuels. Sizes range from 10 to 500 hp. for 15 to 200 psi, operating pressures. Construction is an improved two-pass version of the Scotch marine boiler.—Boiler and Engineering Supply Co.

Heating Tape In Three Styles

(218C) Electric heating tapes, currently being introduced in this country from England, are offered in three principal designs. An uninsulated tape gives good contact with the surface to be heated and permits you to look through the tape into the vessel or column. However, heat losses to the surroundings are high and overlapping and accidental contact must be avoided.

Another style is insulated on one side, still permitting direct contact with the surface but cutting down on radiation losses. The third type is insulated on both sides. This one can be safely wound onto metal as well as glass, making it potentially useful in the plant as well as in the laboratory.

All these tapes consist of one or more fabric bands of resistance wire separated and bordered by bands of glass fiber yarn. They are rated at

about 2½ watts per sq. in. and can produce temperatures of over 400 deg. C. Special tapes can be made to specification up to 18 watts per sq. in. All are fitted with lead-in wires.—Standard Scientific Supply Corp.



Cooling Tower Has Low Profile

(218D) The new double-flow Aquatower is claimed to be lower in height than any other cooling tower of similar capacity. For example, the 150-ton unit stands only 7½ ft. high. Pumping head and fan horsepower are said to be extremely low for any given capacity and design performance.

This tower uses the double-flow principle, in which one fan draws air from two completely open sides. It is made in seven standard sizes, starting with a 50-ton unit, and is available in all steel or wood with asbestos cement board casing.—Marley Co.

NEW FLUIDS HANDLING EQUIPMENT

Relief Valve Controls at Low Pressures

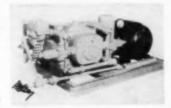
(218E) The new Andal Type C-13 relief valve provides pressure control of gases and vapors within a pre-set range of 7 to 10 psi. Exact setting is adjusted by means of a screw at the top of the valve.

Three models are available, having 4-in., 4-in., or special pipe threads. Standard length is 1-fs in.; over-all diameter is 4 in. Valves can be furnished in brass, steel, stainless steel or other construction as specified.—Andrews-Alderfer Co.

Aluminum Tubing Is Easily Worked

(218F) Alcoa Utilitube is a new general-purpose aluminum coiled tube made of the new B50S-0 alloy. According to the manufacturer, it combines low cost, easy workability and high fatigue strength. It may be had in lengths up to 1,000 ft. or more, depending on size.

Possessing good flaring and forming characteristics, this tubing is said to bend more easily than copper and to work-harden less under repeated bending. Its mechanical properties improve at low temperatures. In addition, corrosion resistance is high in exposure to many industrial atmospheres.—Aluminum Co. of America.



High-Pressure Pumps With Simplified Design

(218G) A complete new line of high-pressure pumps features a simplified design using a Scotch yoke driving

mechanism. This design reduces the number of moving parts to a minimum, the manufacturer claims, thereby lowering maintenance costs. There are no connecting rods, crankshafts or wrist pins.

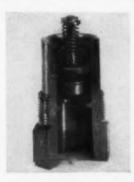
The plunger works entirely clear of the cylinder walls, riding on packing which is constantly lubricated through an Alemite fitting. Packing is adjusted from the outside; adjustments can be made even with the pump in operation.

The new pumps are made in two and four-cylinder models. Capacities range from 3½ to 60 gpm. and pressures from 350 to 1,000 psi.—The Royalton Co.

Positive Displacement Pump Handles Many Fluids

(218H) A new positive displacement pump with Teflon impeller, Teflon-packed stuffing box, Teflon or Graphitar bearings and stainless steel casing and shaft handles most fluids

encountered in process operations. It operates in either direction and delivers 1 to 20 gpm. at pressures up to 40 psi. Sizes available are å, ½ and å in. I.P.S.—Eco Engineering Co.

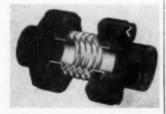


Excess Flow Valve

(219A) A recent development in excess flow valves is one which will not chatter. Conventional valves in pipelines and in outlet pipes from tanks chatter under certain flow conditions, because of liquid hammer effect. This chattering is undesirable, not only because of the noise, but also because of damage often inflicted on the valve. A valve subject to chattering will frequently fail to stay closed in an emergency, especially at low pressures.

Extensive flow tests led to the development of a throttling type disk which would close without chattering at unusually low upstream pressures. In most cases the upstream pressure could be as low as 10 psi.

The 1519C valve illustrated is made for use with tanks for the protection of top outlets, although it can also be used in end and bottom outlets. Another new valve, the 1519A2, is designed along the same principles for use in pipelines.—Philips Petroleum Co.



Bellows Connector Solves Piping Problems

(219B) Fabricated of Teflon, this new bellows connector can be applled to piping problems where vi-(Continued on page 221) 140-1

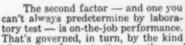


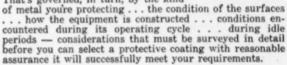


TO CORROSIVE MEDIA

How well a coating withstands the action of a given corrosive agent is the first factor you must necessarily consider in choosing the right coating for your needs—but it's only the first.

TO SERVICE CONDITIONS





Dampney equipment-engineered coatings give you that assurance because they are formulated to do certain selective, specialized jobs both large and small, difficult and routine — to give you the protection that is right for you — not in a costly, custom-made material nor an all-purpose anti-corrosive, but in a coating engineered for the equipment it is to protect.

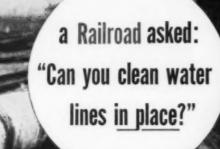
Dampney's industrial equipment knowledge is yours to call upon freely. Let us put it to work on your next coating problem.



BOSTON 36, MASSACHUSETTS

DOWELL SERVICE

CHEMISTRY APPLIED TO MAINTENANCE CLEANING PROBLEMS





Dowell Service cleaned over 8600 feet of buried water line in six days!

You don't have to dig up water lines in order to clean them! Take the case of a major railroad that had over 8600 feet of baried water lines, ranging from 2 to 12 inches in diameter. The capacity of these lines had been greatly reduced by scale deposits. Dowell Service cleaned all the lines, in place, in only six days with a minimum interruption in service.

Dowell Service offers fast, effective cleaning of pipelines—underground or above, indoors or out. No digging or dismantling is necessary. Dowell liquid solvents, designed to dissolve the accumulated deposits, are introduced through regular connections. Because they are liquid,

Dowell solvents reach wherever steam or water flow, cleaning places inaccessible to other methods—angles, curves, valves, complicated surfaces and hook-ups. Experienced Dowell engineers do the job, using Dowell-designed, truck-mounted pumps, mixers and control equipment.

Many other types of equipment can also be cleaned efficiently, economically by Dowell Service. If you have boilers, condensers, evaporators, bubble towers, water wells or other operating equipment where deposits are reducing capacity, let Dowell Service sare you time and money in maintenance cleaning!

Other recent Dowell jobs: Water well cleaned for large utility. Original production of 1150 gpm had dropped to 550 gpm. Dawell Service brought production back to 1100 gpm.

Boiler cleaned for steel company. Steam production before Dowell Service: 115,000 p.p.h.; steam production after Dowell Service: 145,000 p.p.h.

Air cooling system on two 22,500 K.W. generators cleaned for Midwestern Utility company in four hours. Before Dowell Service, the operating temperature of the generator was at the maximum allowable of 60° C. After service, the temperature was a normal 50° C.

DOWELL INCORPORATED . TULSA 1. OKLAHOMA

CALL

New York 20 Boston 16 Philadelphia 2 Baltimore Wilmington 99 Richmond 19 Jacksonville 2 Buffale 2 Cleveland 13 Pittsburgh 19 Datroit 2 Chicago 4 St. Louis 8 Ransas City 8 Wichita 2 Oklohoma City 2 Houston Ft. Worth 2 Shreveport 69 Allasta Indianapolis Louisville Upper Montclair, R Anneston, Alabama Hattlesburg, Mins. Mt. Pleasant, Mich. Namilton, Ohio Charleston, W. Va. Salem, Winots Beaumont, Texas Biorger, Texas Midland, Texas Wichita Falls, Texa Hobbs, N. Mex.

& Maintenance cleaning service for industrial heat exchange equipment & Chemical services for ail, gas and water wells.

* Magnesium anodes for corresion control.



A Service Subsidiary of
THE DOW CHEMICAL COMPANY

EQUIPMENT NEWS, cont. . .

bration, expansion or electrolytic corrosion must be overcome. End flanges of the joint are French-type envelope gaskets integral with the joint. This makes for easy assembly between companion flanges and a tight seal on installation.—Crane Packing Co.



Globe Valve Is Very Compact

(221A) This 4-in. globe valve, of a special design for 10,000 psi., is used on the first nuclear powered steam turbine, now being tested. Parts are welded together, giving full flow through the valve. Packing gland bolts have been eliminated.

Design of this valve makes it extremely compact, compared with ordinary cast steel valves for high pressures. Made of stainless steel throughout, it uses stems and disks of the new Type 322 stainless, which combines a high degree of corrosion resistance with uniform hardenability.

Similar valves can be furnished commercially with either bolted or welded caps and with screwed, flanged or socket weld ends. Sizes range from \(\frac{1}{2} \) in. to 6 in.—Hoppe Engineering Co.

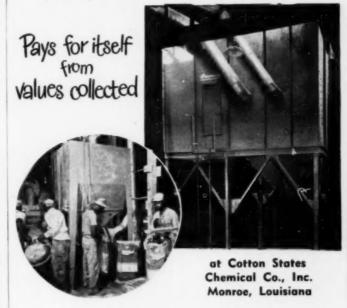
Fluids Handling Briefs

Welding Fittings—Complete new line of alloy steel fittings and flanges. Greater wall thickness throughout, with added thickness at all areas of stress. Key Co. (221B)

Compressor Check Valve—Automatically eliminates danger through failure of operator to open proper valve when starting compressor. Pennsylvania Pump & Compressor Co. (221C)

Sight-Flow Indicator — Windows are sealed by O-ring gaskets and retaining rings, giving equal distribution of pressure on the glass. Made in sizes ½ in through 4 in Trinity Equipment Corp. (221D)

DUSTUBE salvages agricultural chemicals



Three Dustube Collectors are being used by the Cotton States Chemical Co. in the manufacture of Agricultural Chemicals. One Dustube ventilates the work areas around the blenders and "sack-off" stations. A second Dustube ventilates a mill grinding Benzene Hexachloride and DDT. A third Dustube handles exhaust air from a cyclone ventilating a mill grinding concentrates such as toxaphene and aldrin.

"We installed these collectors to regulate the dust in the air, a nuisance to us and our neighbors, besides being a fire and health hazard," writes Mr. L. P. Harris, Mgr. "We are paying for the units by the values collected and returned to the products. At least \$50.00 worth of material is salvaged per day in the second and third Dustubes and about a third as much in the first. We have been very well satisfied with their efficiency."

The Dustube is the efficient, low-cost way to ventilate chemical processing operations of all types. You will want to read about its 10 advantages in the new catalog, just released. Write today for your copy of Catalog No. 72-B.



AMERICAN WHEELABRATOR & EQUIPMENT CORP., 347 S. Byrkit St. Mishowske, Indiana

When inquiring check CP 7939 on handy form pgs. 2-3

NEW INSTRUMENTS & CONTROLS

Rotameter Floats Are Interchangeable

Greater flexibility and interchangeability are now possible with rotameters using precision-made predictable performance floats. Coupled with the prior development of precision metering tubes, this advance makes it possible to deliver from stock a rotameter whose calibration for any particular fluid can be accurately predicted. You can even change the service for a rotameter and recalibrate it simply by reference to corrections shown in prediction curves.

Four basic float shapes have been adopted to implement this program. Selection of the shape best suited for a particular application is based on vis-cosity and flow conditions. Fischer

& Porter Co.

Liquid Level 6age Uses Ultrasonies

(222B) A new type of industrial liquid level gage resembles in principle the sonic depth gage used in marine navigation. It uses a transducer at a fixed position at or near the bottom of the tank or vessel. The transducer takes pulses of electrical energy and transforms them into pulses of sonic energy. These pulses are directed upwards at the surface of the liquid and are reflected back to the transducer, where they are reconverted to electri-cal impulses. Transit time of the pulses through the liquid is an accurate measure of the distance from the transducer to the surface of the liquid.

Output from the circuits is reproduced on meters, decade indicators or tape type printers. Indications can be telemetered to distant points if

The electronic equipment may be common to many tanks in a group, since only a short time is required for measuring any tank level. Switching from one tank to another can be performed automatically or manually. Bogue Electric Mfg. Co.



pH Meter Is Accurate and Versatile

Versatility is a big selling point for a new pH meter—it is designed for all pH and rH work, for potentiometric titrations and for oxidation-reduction potential investigations. It can be used with glass, quinhydrone, hydrogen and platina electrodes and is direct calibrated for the first three. It provides a measuring accuracy of 0.01 pH or 0.5 my with a range of 0 to 14.15 pH and 0 to 1,415 mv.

The meter is supplied with a new removable calomel and glass electrode and is provided with controls which correct for temperature variations and for asymmetric potentials.-North

American Philips Co.



Beta-Ray Gage For Wide Sheets

Improving on the original Model BG-1 introduced last year (Chem. Eng., June 1951, p. 156), the new Accuray Model R includes an automatic control for positioning the measuring unit laterally across the sheet. This enables you to get a profile reading across the entire sheet width. Another Model R development is a remote control station with repeat meter which permits you to read and control the gage from a distant point.

Basically, the gage consists of a beta radiation source below the sheet and a detector above it. The detector measures the amount of radiation penctrating the sheet, which is recorded in terms of weight per unit area of the

sheet.

The twin gage installation shown here is on a tire calendering line at Gates Rubber Co., Denver. Use of two gages enables Gates to obtain simultaneous measurements on each side of the sheet. The operator can thus control with closer tolerances than were previously possible.

The Accuray unit is made in sizes for measurements up to 24, 36, 48 and 60 in. from the edge of the sheet.—

Industrial Nucleonies Corp.





DESK-TOP UNIT OPERATES ELECTRONIC COMPUTER

A control panel approximately the size of a standard typewriter (left) provides remote operation of a new general-purpose electronic computer. Computation is controlled by 101 vacuum tubes operating through the germanium crystal diode nerve center shown at the right. A typical calculation problem which would require 69 working days with a desk calculator can be solved by the computer in 2 hr.—Computer Research Corp.

CO. Recorder Has Fast Response

Five-sec. response, with an accuracy of 0.25 percent, is claimed for a new CO, recorder. The quick response is the result of rapid change of sample gas in the gas passage system, the small volume of gas in the analyzing cell, and the continuous connection between the analyzer and the recording pen motor.

Known as the Condu-Therm, this instrument uses the thermal conductivity principle of gas analysis. Gas to be analyzed conducts heat away from



- * Greatly reduced grinding temperatures
- * Considerably decreased power consumption
- * Increased capacity
- * Vastly wider range of application
- * Dust elimination thru reduced air flow

For close to 30 years MIKRO engineers have striven not only to meet the day-to-day needs of our many customers—but to anticipate the requirements of the processing field.

Now, as one of our recent developments, we offer a MIKRO-PULVERIZER with all the time-tested qualities of the older model—but with internal improvements that entitle it to consideration as a BRAND NEW machine.

The new MIKRO-PULVERIZER has particular value in the grinding of heat-sensitive materials. When tested on certain

key materials it has effected a 25% reduction in temperature rise and a corresponding decrease in horsepower consumption. Or, in lieu of the horsepower savings, it has provided a 30-50% increase in production.

The enhanced efficiency of the new MIKRO-PULVERIZER widens its field of application by making possible the grinding of some materials hitherto found baffling or impossible to handle.

This project is still in the development stage. We know it works an certain materials and we are endeavoring to estimate its range. Right here, you can help yourself by letting us try this new grinding method on your own material in the MIKRO Laboratory. The test will cost you nothing, but it may solve your problem and bring you increased results and savings.

PULVERIZING MACHINERY COMPANY

SS CHATHAM ROAD - SUMMIT, NEW JERSEY

PULVERIZER,

MIKRO-PULTINEZER
Also Makes of the MIKRO EDILICTOR

Investigate the passibilities of this new MIKRO-PULVERIZER, available in five sizes, varying only in capacity

PRESERVE OUR HERITAGE: FAITH, FREEDOM AND INCENTIVE



A shipment of five Pyroflex Construction Reaction Vessels

Corrosion Resistance First!

When completely corrosion proof equipment is required give first call to Maurice A. Knight.

For towers, tower packings, drain lines, fume ducts, acid jars, filters and valves, we offer KNIGHT-WARE, a chemical stoneware which is completely corrosion proof throughout.

If the need is for complete functional units such as pickling tanks, gas cooling towers, acid fume washers, HCl plants, etc., we supply PYROFLEX Constructed Units designed to individual requirements. These units incorporate whatever materials are best suited to individual operating conditions. Materials may include KNIGHT-WARE, PYROFLEX, PERMANITE, glass, fused silica, plastics, carbon or any other suitable material. Knight engineers have had wide experience in the proper selection as well as the application of corrosion proof materials. Consequently, Pyroflex Constructed units offer longer trouble free service.

Knight PERMANITE is a light weight laminated plastic that is corrosion proof throughout. It is used as a construction material in HCl Absorbers, fume washers, towers, heat exchangers, etc. It is also fabricated into light-weight pipe and fume ducts, and may be used as a reinforcing armor on KNIGHT-WARE Chemical Stoneware.

When making inquiry, please specify the type of equipment in which you are interested as well as service conditions involved. Literature will be sent on request.

MAURICE A. KNIGHT 102 Kelly Ave. Akron 9, Ohio





KNIGHT-WARE

EQUIPMENT NEWS, cont. . .

a resistor in proportion to its thermal conductivity. Heat conducted away from the resistor changes its electrical resistance. The change is measured by an electronic circuit; older models used a conventional galvanometer circuit.—Hays Corp.



Automatic Weighing System Uses Only One Scale

(224A) The Select-O-Weigh is a recently developed automatic weighing system which can handle consecutively up to 12 ingredients with only one scale. Heart of the system is a simple electronic circuit with no arcing contacts, making it safe to use in hazardous locations. A standard automatic scale is used as the weighing element, with a pendulum dial scale acting as the force-measuring component.

A master control panel for any particular system is built to include as many setting dials as there will be ingredients in the batch. The scale operator, who may be located remote from the actual weighing operation, sets each dial on the control panel to correspond with the amount of each ingredient in the batch. Sequence of adding materials and their timing are selectively controllable.

After setting the control panel, the operator presses a starting button. This actuates a screw feeder mechanism, delivering to the scale the amount of material set on the first control dial and then stopping. This action is visible on the scale dial. Then, depending upon the settings of the various selectors and controls, the scale either discharges to a mixer or goes on to the next ingredient. Circuits may be arranged to provide either delivery of consecutive weights or accumulation of the whole batch.

Following discharge of the scale, a tare check circuit prevents the scale from initiating the next weighing unless all material is cleared from the weigh hopper and the unit is in perfect empty balance. This is done by electrically verifying the repositioning of the dial scale pointer at exact zero or empty balance position.—Richardson Scale Co.



Program Control Regulates Temperature Cycle

(225A) Simplytrol temperature control units can now be supplied with automatic timers which will change the temperature setting according to a predetermined program. The temperature setting cam is driven by a clock motor. Although 12 and 24-hr. clocks are standard, other time cycles can be furnished.

The instrument illustrated is one of a group used to control the temperatures of gas furnaces in an investment casting plant. Starting at 250 deg. F. the temperature setting is increased gradually during a period of 4 hr. to 600 deg. This preheat drives all moisture from the plaster mold. During the next 4 hr. the temperature is increased to 1,400 deg. and held there to melt out the wax pattern. The setting is then raised to 1,800 deg. to burn out the residue of wax left after melting. Finally, the temperature is reduced to 1,400 deg., the optimum heat for pouring.-Assembly Products, Inc.

Instrumentation Briefs

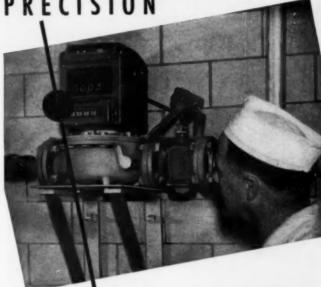
Vacuum Tube Voltmeter-Model 161-A for d.c. voltages up to 1,000 and a.c. up to 300. Frequency range of 60 cycles to 700 megacycles. Electronics Measurements (225B) Co.

Level Alarm-Designed for high-pressure service. Works on a thermostatic principle without bellows, diaphragms, weights, floats or differential pressure devices. Northern Equipment Div.

Thickness Gage-Provides a nondestructive method, based on X-rays, for measuring thickness of tin-plate. North American Philips Co.

Refractometer-Provides accurate readings of index of refraction and average dispersion of liquid, solid and powdered samples. Electro-Physics (225E)

LABORATORY PRECISION



at Production Rates

WITH



Batch mixing with laboratory precision is automatic with these Neptune Auto-Stop liquid meters. You simply push buttons to set the quantity of ingredients required by formula, open the valve, and the meters do the rest. They pay for themselves by eliminating spoilage, spillage, over-filling and the fuss and muss of gauge sticks, pails or batch tanks.

The easy to read registers give you accurate, quick cost accounting figures too. The Auto-Stop is only one of many Neptune meters available for handling over a hundred industrial liquids-including water, syrups, brines, oils and many chemicals. Famous for simplicity, sustained accuracy, and low maintenance. Telephone or write our nearest branch for quick information.

SEND FOR NEW BULLETIN 566-H

. . . a gold mine of information that helps select the right meter for your process.

NEPTUNE METER COMPANY 50 West 50th St. . New York 20, N. Y.

Branch Offices

ATLANTA . BOSTON . CHICAGO DALLAS . DENVER . NO. KANSAS CITY, MO. LOS ANGELES . LOUISVILLE . PHILADELPHIA PORTLAND, ORE. . SAN FRANCISCO Canadian Factory: TORONTO 14, ONT.





Solventol Chemical Products, Inc., Detroit, Michigan has joined the growing list of manufactures who are saving money by using Platecoils in their products. Use of Platecoils as the heating medium in their 3-stage washer has resulted in

1. Simplified installation.

Sharply reduced installation costs.
 A higher rate of heat transfer.
 Low first cost.

6 major advantages:

5. Solution flow controlled without baffles.
6. Increased sales advantages due to easier maintenance.

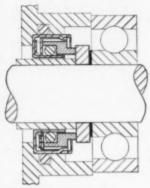
The Platecoils are installed in each of the three sump tanks as shown in the inset picture. The pre-fabricated Platecoil units are installed in but a fraction of the time required for bending and installing pipe coils. That's why most manufacturers find it costs less to buy and install Platecoils than to fabricate pipe coils in their own plant.

In addition, the Platecoils are about 50% more efficient than pipe coils. As a smaller size Platecoil can be used, considerable savings in steel and more compact machine designs are possible.

If you're looking for ways to conserve steel and save money, get the facts on Platecoil today. Write for bulletin P61.



NEW ELECTRICAL MECHANICAL EOUIPMENT



Mechanical Shaft Seal For Unusual Applications

Higher pressures, temperatures and rotating speeds are possible with this mechanical shaft seal. In the construction of this new seal, materials are used which will withstand exposure to many liquids and gases without deterioration. Because of simplicity in its basic design, the new seal can be varied to meet many extraordinary operating conditions or assembly problems.—Cartriseal Corp.



Drafting Tool Does Many Jobs

The Paraline is a new drafting device which provides in one instrument a T-square, straightedge, triangle, protractor, 1/32-in. scale and parallel rules. It is particularly suited for angular line layouts and cross hatching

Small enough to be carried in your pocket, the Paraline measures 101 by and requires no attachments or board clamps. Price is about \$3.-Loomis Industries.

Gas Turbine **Drives Small Generator**

Design details have recently been released on a new small gas turbine which is used to operate an emergency 250-kw. electric generator

on Navy ships. Many possible industrial uses are predicted for such small units.

The gas turbine engine, controls and reduction gear box together weigh only 561 lb. The unit is 5 ft. long; both height and width are less than 3 ft. It replaces a diesel-driven generator set of roughly ten times its size and weight.—Solar Aircraft Co.



Packing Glands Seal Small Openings

(227A) A new series of stainless steel packing glands will accommodate tubes from \(\frac{1}{2} \) in. to \(\frac{1}{2} \) in. O. D. (\(\frac{1}{2} \) in. I.P.S.), and the manufacturer expects to increase the maximum size to \(\frac{1}{2} \) in. dia. in the near future.

These glands may be used as small stuffing boxes or to seal static lines, thermocouple wells, thermometer stems, or any other round tubes or rods. Any type of packing material may be used.—Conax Corp.

Electrical & Mechanical Briefs

Speed Reducers—New series of vertical worm gear units, in seven sizes. Particularly suited for agitator and mixer drives. Cleveland Worm & Gear Co. (227B)

Multi-Stage Turbines — Available in four designs, 200 to 5,000 hp. Wide selection of performance ratings for condensing, non-condensing or automatic extraction applications. General Electric Co. (227C)

Indicating Starter-Manual motor starters in NEMA sizes 0 and 1 with built-in indicating lights to show whether the starter is on or off. Lights can be provided for a.c. voltages of 110 to 600. Westinghouse Electric Corp. (227D)

Variable Speed Drive—Model No. 8000 Motodrive, with capacity of 25 hp., available in all speed ranges from 2:1 to 6:1, in horizontal and vertical designs. Reeves Pulley Co. (227E)

Welding Machine — High-velocity downdraft of air over a.c.-d.c. rectifier stacks assists cooling, eliminates stack failures. Available in 200, 300 and 400 amp. ratings. A. O. Smith Corp. (227F)—End

NEW USES FOUND FOR UNIQUE PROPERTIES OF METALLIC OXIDE PIGMENTS



Product Planning



Product Improving

You ordinarily think of metallic oxide pigments being used to produce coloring agents, catalysts, polishing agents and magnetic materials.

Today, however, new product planners and production engineers are finding uses for the unique physical and chemical properties of metallic oxides which are surprisingly far afield from traditional usages.

Below is a review of their characteristics. Look them over. You may get the germ of an idea which will lead to the improvement of existing products . . . or to the reduction of new product manufacturing costs.

Should an application suggest itself, write. We'll be glad to cooperate with you in exploring the possibilities. Address Dept. 3, C. K. Williams & Co., Easton, Penna.

Con and a contract		
Hame	Proportios	Characteristics
Pure Red Iron Oxides and Indian Reds Pure Yellow Iron Oxides Pure Black Iron Oxides Pure Chromium Oxides (and Hydrates)	Fe ₈ O ₂ -98.5% SpG5.15 Color—Salmon to purplish red Fe ₈ O ₄ .H ₂ O-99% SpG-4.03 Color—Lemon to dark orange Fe ₈ O ₈ -96% min. SpG4.96 Color—Blue Black Cr ₅ O ₂ -99% SpG5.20 Color—Light to dark green	Compositions The basic colors of the iron and chromium oxides are determined by chemical composition. Reds are ferric oxide (Fe ₂ O ₂); yellows, hydrated ferric oxide (Fe ₂ O ₃); and greens, chromic oxide (Cr ₂ O ₃). All these compounds are chemically stable and light permanent. Particle Shapes Physical
Natural Oxides—Ochers, Umbers, Siennas, Metal- lic Browns, Red Oxides	Wide range of ferric oxide con- tent and red, yellow and brown colors	 properties such as oil ab- sorption and suspension characteristics are depend- ent on particle shape, con- trolled by manufacturing processes.
Venetian Reds	Fe ₂ O ₂ -40% SpG3.45 Color—Light to medium red	Size: Color range is controlled by particle size — average size increases as color darkens. Uniformity of size determines bright- ness.
Cuprous Oxide	Cu ₂ O-97% min.	Purity: Freedom from impurities is cessontial for superior pigment proper- ties and to prevent dele- terious effects in end- products. Control of solu- ble salts, manganese and copper content are an im- portant part of the Wil- liams' manufacturing op- eration.
Extenders—Barytes, Calcium Carbonate, Calcium Sulfate, Silica	Wide range	

COLORS & PIGMENTS

C. K. WILLIAMS & CO.

East St. Louis, III. • Easton, Penna. • Emeryville, Cal.

108 shades and types of iron oxide pigments

Product News Edited by Frances Arna







. . . turns out paper that is stronger wet than dry.

First All-Glass Paper Excels

In air or gas filtering; as an insulator and dielectric. It boasts high resistance to heat, moisture, chemicals and microorganisms. (228A)

All-glass paper, until now considered an impossibility, will be on the market soon. From a mixture of water and commercially available fine glass fibers (1 percent), continuous sheets may be formed on a conventional papermaking machine.

National Bureau of Standards fathered the development in cooperation with the Naval Research Laboratories. Several firms are making plans for commercial production. Four of them-Hurlbut, Ashuelet, Hartford City and Whitehouse paper companies-have already made successful trial runs.

Two principal applications where the glass paper promises to replace conventional papers are as an airfilter, as an electrical dielectric and insulator. It may also find some use in filtering liquids.

As an air-filtering paper, tests at NRL show the new paper to be many times more effective than present commercial filters. It seems particularly valuable for gas masks and respirators used by firefighters, industrial and medical workers and military personnel. In gas mask tests in a smoke-filled room, only one smoke particle in 100,000 passed through the glass-paper filter.

Until now, many air filters have

relied on imported raw materials. Glass, however, can be produced from raw materials abundant in the United States.

Because of excellent electrical characteristics, it can be used to make oil-impregnated paper capacitors capable of operation even at tempera-tures above 200 deg. C. Suitable oils are available which withstand such temperatures, but the kraft paper commonly used is unsatisfactory for prolonged operation at temperatures much above 100 deg. C.

These applications all benefit from the paper's chemical inertness. It is highly resistant to effects of heat, moisture, chemicals and microor-

The glass-fiber raw material is relatively expensive, but cost of conversion into paper is low. The rivers now cost between \$2.50 and \$8 per lb., depending on the grade. Fiber costs should go down substantially with anticipated increased production of the fibers. Conversion should cost less than with other paper because (1) beating time is short, (2) the paper isn't dried completely so less heat is used, (3) it goes through fewer presses so less power is used. Strength of the glass paper is not

superior to that of other papers. Ex-

periments indicate that it depends on the presence of fibers of assorted lengths, but that very short fibers weaken the paper if present in sub-stantial quantities. When the paper is wet, the strength improves.

In manufacturing conventional paper, prolonged beating reduces some of the cellulose to a gelatinous substance that cements the fibers together and strengthens the paper. With glass, on the other hand, bruising tends to weaken the paper, and no binding agent is formed. By addition of binders, NBS researchers think they may be able to improve strength.

Two Weed Killers

With more crop tolerance than 2,4-D to which they are

Both Monsanto and the Dept. of Agriculture have come out with weed killers which can be compared with and offer some improvements over

Monsanto Chemical Co. is the first U. S. producer of 2-methyl-4-chlorophenoxyacetic acid. A hormone-type weed killer already widely used in Europe, it is now available here in experimental quantities.

Though similar in action to 2,4-D, MCP offers these added benefits: less injurious to various grasses, cereal crops and legumes; more effective in controlling such grain pests as Canada thistle and deep-rooted perennials.

A light tan, granular solid, MCP may be applied as a dust or in solution. It is easily solubilized by converting it to the sodium, potassium or amine salt. The acid may also be esterified.

Concentrates of 4 ppg. (acid equivalent) of the technical grade are possible with the sodium, potassium and amine salts. Slightly lower concentrations of the sodium salt may be required for low temperature stability. Most widely used form of MCP has been the sodium salt.

The Dept. of Agriculture's new chemical spray, known as EH-1 or Crag Herbicide-1, is closely related to 2,4-D but it is not as toxic to straw-

berry plants.

Technically sodium 2,4-dichlorophenoxy ethyl sulphate, EH-1 kills weeds effectively only when applied to the soil where it is absorbed by the germinating seeds or root systems of young grasses and broad-leaved weeds. Its herbicidal properties probably are due to the ability of soil microorganisms to convert the chemical into an active plant poison.

For effective use in strawberry fields, all weeds must be removed before the chemical is applied. When applied on clean fields after strawberry plants are set, it acts as a pre-emergence herbicide on grasses and other weeds. At Plant Industry Station, Beltsville, Md., in 1951, two applications effectively controlled weeds for the remainder of the season in newly set

In commercial strawberry fields, applications normally will be at a rate of about 3 lb. of the herbicide per acre. The new herbicide is expected to be available during 1952.

Triallyl Cyanurate

Promising possibilities in the field of heat-resistant resins. (229A)

New trifunctional alkoxytriazine's properties make it of particular interest in polymerization reactions, pharmaceuticals, pest control and as a chemical intermediate. American Cyanamid has just put the new monomer on the market in pilot plant quantities.

Polymers formed from triallyl cyanurate itself are hard, clear and somewhat brittle like glass. If sheets of glass cloth are impregnated with the monomer, the sheets pressed together, and polymerization initiated with heat and a latent catalyst, laminated materials may be made. They have a high flex strength which remains essentially unaltered for long periods of time even at temperatures above 230 deg. C.

Copolymers made from triallyl cyanurate and an alkyd resin, styrene

IN BRIEF-A capsulated listing of this month's newsworthy products

It's New	It's Good For
Glass Paper	Resisting heat, moisture, chemicals, microorganisms238A
Weed Killers	Many of the uses of 2.4-D with less injury to crops 228B
Triallyl Cyanurate	Polymerization reactions, pharmaceuticals
Resin	Withstanding temperatures to 500 deg. F
Propanediole	Repelling certain biting insects
Briquetting	Increasing product usability, salephilty
Surface Active Agents	Remaining stable in alkaline or acid media23015
Plutonium 242	Intermediate for other transuranium elements
Fiberglass Fabric	Temperature resistant gaskets, ducting232A
Iron Remover	Absorbing iron from liquids such as drinking water 234A
Polyvinyl Chloride	Chemical and waste disposal pipelines234B
Film Base	Guarding against fires more efficiently
Sequestering Agent	Forming complex molecules with metal ions234D

Don't Forget: Reader service postcard inside back cover will bring you more information. Use these key numbers.

1

or other vinyl monomer also show most of these desirable qualities. They are reported to have excellent alkali, acid, and heat resistance.

Triallyl cyanurate is compatible with alkyd resins such as maleic anhydride-ethylene glycol, fumaric acidethylene glycol. Therefore copolymerization reactions are relatively simple. Cure may be accomplished rapidly and without the presence of air. These resins may be used in laminates, molding compounds, coating compositions, adhesives, and for casting, particularly in high-temperature applications.

Transesterification reactions with numerous glycols at temperatures in the range of 100 to 140 deg. C. give products with a variety of properties. Some are clear gels, others are rubbery solids or viscous oils. These polymers have been suggested as plasticizers for other resins and for textile softening.

Triallyl cyanurate has been successfully tested in mice as an anti-convulsant. A 0.1 percent solution of triallyl cyanurate in 65 percent acetone has definite insecticidal properties.

As supplied the product contains 10 ppm. of hydroquinone and has a minimum freezing point of 24 deg. C. It is now selling for \$7.50 per lb. This price will be very markedly reduced as the scale of production is increased. Ultimately the company hopes to be selling triallyl cyanurate for less than \$3 per lb.

Laminating Resin

Owes its heat resisting properties to triallyl cyanurate (see above). (229B)

A new polyester laminating resin which will withstand temperatures as high as 500 deg. F. has been developed by Naugatuck Chemical division, United States Rubber Co. It is being marketed as Vibrin X-1047.

Its most significant use will probably be as a structural material in the manufacture of high-speed aircraft and guided missiles. Wright Air Development Center in Wright Field, Ohio, is now testing it for this type of ap-

Physical and handling properties are comparable to other types of polyesters now available with the added benefit of high strength at high temperatures. Laminates made with the resin and glass fabric retain good flexural strength when exposed for as long as 200 hr. at a temperature of 300 deg. F. Good flexural strength is also obtained when exposed for as long as 24 hours at 500 deg. F. The greater heat resistance is made possible by the use of the new chemical, triallyl cyanurate.

The resin is now available for military applications only. Naugatuck is raising production capacity to supply resin fabricators who require heat resistance for applications in the electrical, electronic, radio and television industries.

Propanediols

Finding uses in the insect repellent and chemical and pharmaceutical fields. (229C)

Now commercially available from Carbide and Carbon Chemicals Co. are 2-ethyl-2-butyl propanediol-1,3 and 2,2-diethyl propanediol-1,3.

These white crystalline substituted diols undergo reactions characteristic of primary alcohols. They react readily with acids to form mono- and diesters that are useful as plasticizers, synthetic lubricants and emulsifying agents.

Certain biting insects are repelled by 2-ethyl-2-butyl propanediol-1,3. Since it is a solid, it has a lower vapor pressure than the common liquid repellents and affords longer lasting protection. It can be formulated with other repellents to produce an allpurpose clothing impregnant. Alone, it can be easily applied to fabrics from aqueous emulsions.



Sizes and shapes of typical chemical briquettes. Larger ones are coal and ore.

Briquetting Invades the CPI

Growing use of this processing step in chemical manufacture has the industry alerted to its real contribution to products' handling ease, sales appeal. (230A)

Briquetting* is usually firmly associated in people's minds with fuels. But chemical manufacturers are rapidly enlarging their view of the subject.

More and more of them are using it to increase the usability and salability of an end product or as an intermediate step to facilitate a chemical process. Among chemicals now agglomerated with briquetting machines are ferrous sulphate, barium chromate, sulphur black, silica gel, sodium chloride, sodium sulphate.

Columbia-Southern makes soda ash briquettes about 1½ by 1 by ½ in. in walnut shape. They provide the iron industry with a convenient, dust-less form of the chemical for reducing the sulphur content of pig iron. Monsanto's pillow-shaped briquettes of toxic, corrosive maleic anhydride make handling safe and simple. Mathieson Chemical puts out PH Plus and Purite briquettes, which are basically sodium carbonate.

Mechanical reasons for briquetting are important to the CPI. These include compressing one or more ingredients together to form a unit charge. It is used to reduce dust, especially in the case of noxious or toxic products.

Briquettes in general range in weight from several grams to a pound or more. They reduce packaging costs by increasing bulk density. They prevent products from caking in containers. In certain cases finely divided products are briquetted and subsequently ground to produce a certain mesh size.

At least two CPI applications involve the briquetting of two or more solids in an intimate mixture in order to prevent segregation during subsequent processing. In some glass plants the ingredients are thoroughly mixed and briquetted before charging to the furnace. In the Pidgeon process for making magnesium, dolomite and ferrosilicon are briquetted together for charging into retorts. In making calcium carbide, lime and coke fines are briquetted for a furnace charge. These would otherwise be unusable screenings.

Other processing advantages of briquetted products are reduced flue or stack losses of ingredients, increased rate of heat transfer in certain processes. It provides a uniform percentage of voids for reactions occurring in fixed beds. This is of importance where direct heating by hot flue gases is employed or where a gaseous or liquid component enters into a reaction.

ters into a reaction.

TVA has successfully experimented with briquetting phosphate fines. Research departments of many companies are at work investigating briquetting possibilities of their products. There are records of success on: am-

monium chloride, diatomite, petroleum coke, plastic molding compound, potassium chloride, resin powder and organic flakes.

Most organic compounds briquette readily at moderate pressures. Typical ionic salts can be briquetted without binders but require comparatively high pressures. Tightly bonded compounds such as SiO₂ cannot be briquetted by pressure alone; frequently used binders are petroleum asphalt, coal tar pitch and starch in combination with either of the first two.

Surface Active Agents

Wetting emulsifying, foaming, antifoaming or dispersing agents. (230B)

Hercules Powder Co. has put on the market three new nonionics, each stable in either alkaline or acid media. Each is unaffected by hard water or the presence of metal ions.

Called B-48, B-79, and B-97, they can function alone or in combination with either anionic or cationic surface active materials to develop mixtures with optimum activity for any of a wide variety of purposes.

A polyethylene glycol ester of rosin, B-48 is a clear, amber-colored viscous liquid. It shows excellent detergency on cotton and wool. Its essentially nonfoaming property gives it the added ability to aid in controlling foaming in industrial and other applications.

A clear, pale straw-colored viscous liquid, B-79 is a polyethylene glycol cher of an alkylated phenol. This product has the greatest surface activity of the three nonionics.

With surface active properties intermediate to the other two, B-97 is an ester-ether type of material.

Plutonium 242

New isotope may be a key building block for other new transuranium element and isotopes. (230C)

A heavy, long-lived isotope of plutonium, plutonium 242, recently produced at the University of California's radiation laboratory, does not have the extreme radioactivity which makes most transuranium elements so hard to handle. Its half-life is 500,000 years compared to 24,000 for plutonium 239.

Plutonium 242 was first identified in the mixture produced when plutonium 239 is exposed to a beam of neutrons, using a mass spectograph. Its appearance can be explained

For the whole story on agglomeration as a unit operation, see the Chemical Engineering Report, Oct. 1951.



"Drycleaners' R" for filtering solvent crystal-clear

MODERN drycleaning plants have discovered that the prescription for keeping their cleaning fluid crystalclear ... an absolute necessity if garments are to be thoroughly cleaned ... is Celite* filtration.

The effectiveness of Celite can be attributed to these important factors which make it unique among filter aids:

Carefully processed from the purest deposit of diatomaceous silica known, Celite is available in nine standard grades—each designed to trap suspended impurities of a given size and type. Whenever you reorder, you are assured of the same uniform, accurately graded powder received in your initial order. Thus, with Celite, you can count on consistent clarity and purity in your filtrates—at highest rate of flow—month after month, year after year.

Drycleaning solvent is just one of

many liquids for which Celite has provided the absolute clarity vital to a successful operation. The proper grade of Johns-Manville filter aid will assure you the same results—regardless of the product or process involved. To have a Celite Filtration Engineer study your problem and offer recommendations, simply write Johns-Manville, Box 290, New York 16, New York. No cost or obligation.

*Reg. U. S. Pat. Off.



Johns-Manville CELITE

FILTER AIDS



There are danger spots in every building (yours, too!) where fire is most likely to strike. These spots can be guarded day and night by a Kidde Automatic Fire Extinguishing System.

At the first sign of flame the Kidde system releases carbon dioxide (CO₂) which blankets the fire—literally smothers it instantly. You can protect several spaces with a single Kidde system...or have separate protection for such hazards as a dip tank or generator.

With a Kidde System, there is no water damage, no messy residue to ruin costly machinery, electrical equipment or documents. And that means no interruption in production. Find out more about Kidde Fire Protection today. Write to:





Walter Kidde & Company, Inc.

228 Main Street, Belleville 9, N. J.

90 He

Garage/

Walter Kidde & Company of Canada, Ltd., Montreal, P. Q.

New Products, cont. . .

through neutron capture by plutonium 241. Since it is the third product in a chain of decreasing productivity, the concentration of plutonium 242 in the mixture is necessarily extremely low. Furthermore, its separation from other isotopes of plutonium is impossible from a practical standpoint.

While analyzing the X-ray emission spectra of the cyclotron mixture, researchers discovered that americium 242, produced through neutron capture by americium 241, not only decays by beta emission to curium 242 but also by orbital electron capture to plutonium 242. Here, since the end product is a mixture of elements—not isotopes—a chemical separation is possible, making a high concentration of plutonium 242 available for further work.



Fiberglass Fabric

Gaskets made from silicone rubber-coated fiberglass material remain pliable between -75 and 500 deg. F. (232A)

Connecticut Hard Rubber Co.. New Haven, is now making a line of silicone rubber sheets reinforced with woven fiberglass.

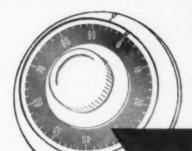
Compared with unreinforced silicone rubber, the silicone rubberfiberglass combination has far greater resistance to tearing, stretching and rupture. Compared with fiberglass alone, it offers impermeability and resilience and a much increased resistance to flex cracking. Compared with most plastics and elastomers, it is flexible at much lower temperatures and it resists atmospheric aging at much higher temperatures.

Summarizing the outstanding properties of this composition, it has flexibility at temperatures as low as -100 deg., as high as 500 deg. F; permanent age resistance in air at 300 deg. F. and long life at intermittent temperatures as high as 500 deg. in air; high tensile strength; high tear resistance; resistance to steam at atmospheric pressure.

Resistance to fruit juices, hydraulic fluids, alcohols, dilute acids, alkalis and salts are claimed for the product. In short, it is said to withstand most chemicals except aromatic solvents.

(Continued)

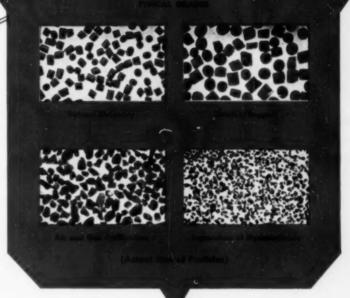
For the RIGHT COMBINATION of Properties



ACTIVATED CARBON

We supply special activated carbons for all gas and vapor adsorption applications. Several grades are produced specifically for:

- · Solvent Recovery
- Air Deodorization and Purification
- Industrial and Military Gas Masks
- Purification of Industrial Gases
- Separation and Purification of Hydrocarbon Gases (moving beds)
- Catalysis of Vapor-Phase Reactions



CARBIDE AND CARBON CHEMICALS COMPANY

A Division of
Union Carbide and Carbon Corporation
38 East 42ed Street Und New York 17, N.Y.

COLUMBIA

Activated
Carbon

SOLVENT RECOVERY - CATALYSIS
GAS AND AIR PURIFICATION

There is no one activated carbon for all uses. Optimum characteristics vary with each application. The right combination of properties is required in an adsorbent for most effective results. And there is a COLUMBIA Activated Carbon with the combina-

tion you need.

Let us help you select the proper COLUMBIA Activated Carbon for your particular job—the grade that combines the best particle size and shape, active surface area, adsorptive and catalytic properties, ash content, hardness, and mechanical strength.

Write today, describing your application, and our engineers will give you further detailed information.

"Columbia" is a registered trade-mark of Union Carbide and Carbon Corporation.



Timperature Recorder with copillary tubing for EYE-LEVEL reading. Priced from \$42.30. Send for new catalog G-143-8, describing many styles of Auto-Lite temperature indicators and recorders.

THE ELECTRIC AUTO-LITE COMPANY INSTRUMENT AND GAUGE DIVISION TOLEDO 1, OHIO

NEW YORK . CHICAGO . SARNIA, ONTARIO

TEMPERATURE RECORDERS & INDICATORS

NICHOLSON MAKES

Freeze-Proof Steam Traps

for Every Plant Use

Because they drain completely when cold, these four types of Nicholson steam traps are positively freeze-proof. Can be freely installed outdoors. Universally recommended for use in lines which need not

be in continuous use during cold weather, because they are freeze-proof and because their 2 to 6 times average drainage capacity results in minimum heat-up

time. The nonair-binding feature of Nicholson traps also notably facilitates heat transfer in severe weather. Sizes ½" to 2"; pressures to 225



206 OREGON ST., WILKES-BARRE, PA.

W.H. NICHOLSON & CO.

TRAPS · VALVES · FLOATS

New Products, cont. . .

Pinning these properties to CPI applications, some possibilities are: in gaskets where resilience is required together with resistance to oils and heat; for the fabrication of flexible ducting where oil, cold and high temperatures are encountered; for the surface of conveyor belts exposed to hot air, deep freezing operations and food products.

The fabrics have excellent dielectric strength and can be used in many electrical applications. Few materials will adhere to their surface, making them ideal for handling many ad-

hesive substances.

These fabrics are carried in stock and are readily available in a variety of thicknesses. They come as yard goods and are sold by the square yard and may be had in rolls up to 50 yd. in length. Die-cut shapes can also be furnished.

Removal of dissolved iron from liquids such as drinking water can be accomplished by a compound developed by Chemical Research Associates, Bernardsville, N. J. A fine white powder, it physically absorbs the iron when the liquid is filtered through it. Tests have shown removal of iron from about 500 to 3 ppm. (234A)

Stainless steel substitute, a rigid nonplasticized polyvinyl chloride of high molecular weight, has been developed by Bolta Products of Lawrence, Mass. Called Boltaron 6200, it has far greater corrosion resistance than stainless and is only ½ as heavy. Typical applications: chemical and waste disposal pipelines, valves and other pipe fittings, spray nozzles, filters and strainers (234B)

Tougher transparent base for photographic film has been developed by Du Pont. Related to the company's synthetic textile fiber, Dacron, it's said to be less flammable than present safety bases. Limited quantities will be tested by motion picture industry and armed forced. (234C)

Sequestering agent, TTA (2-thenoyltrifluoroacetone), is being manufactured and sold in limited quantities
by Dow at Pittsburg, Calif. It has
the unique property of forming
complex molecules with various
metal ions in solution. Separation
of ions which are ordinarily difficult
to separate chemically are permitted
by its use since small adjustment in
pH cause pronounced changes in
the amount of complexing. Price
is \$30 per pound. (234D)





TURBO-MIXER, a division of

GENERAL AMERICAN TRANSPORTATION CORPORATION

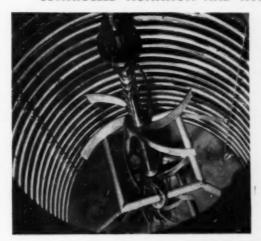
This is a Trade Mark - Turbo-Mixer

It's the name for *creative* mixing devices. Nobody else can use it.

It belongs to one company that specializes in helping you to do successfully the more difficult jobs requiring mixing of liquids with liquids, solids and/or gases. Industrial leaders everywhere have learned over the years that they can depend upon Turbo-Mixer to adapt the relevant factors of mixing from another industry and come up with a most effective mixing method for the specific job being studied.

Designed for Optimum Results...

CONTROLLED AGITATION AND HORSEPOWER FOR THE SPECIFIC JOB





All Turbo-Mixers have an ample safety factor for continuous duty. All may be used 24 bours ! a day—every day—for years.



SALES OFFICE: 10 EAST 49th STREET, NEW YORK 17, NEW YORK
General Offices: 135 South La Salle Street, Chicago 90, Illinois • Offices in all principal cities
OTHER GENERAL AMERICAN EQUIPMENT:— DRYERS • EVAPORATORS • DEWATERERS
TOWERS • TANKS • BINS • FILTERS • PRESSURE VESSELS

What type of **CUSTOM BUILT** WIRE CLOTH PARTS

do you need



heat treating?

straining?



screening?



filtering?



handling?

You can be sure of getting exactly what you need in custom built wire cloth parts when you call-

Cambridge

With more than 30 years experience in this field, we can work from your own prints . . . or, if none are available our design engineers will draw up prints based on your description of the job the part must do.

Our newly expanded production facilities include equipment for cutting, forming, bending, shaping and welding of any metal or alloy in sheet, rod, or wire cloth form ... as well as our large battery of wire cloth looms, Tell us your needs. Let us tell you how economically and quickly we can fill them. Write direct or call your Cambridge field engineer. Look under "Baskets-Wire" in your classified telephone directory.

FREE CATALOG describes Cambridge facilities for febricating metal specialties. Write for your copy today.





The Cambridge Wire Cloth Co. Dept. G . Cambridge 2, Md.

METAL METAI

OFFICES IN PRINCIPAL INDUSTRIAL CITIES

CE's Guide to

NEW TECHNICAL LITERATURE

Reader Service numbers. Circle them on the postcard inside the front cover to get free booklets.

What's New In . .

How To . . .

Company . . .

226A

heat transfer requirements; charts and nomographs. Data and photographs on a newly designed cascade type heat exchanger which utilizes apecially constructed Pyrex brand glass heat exchange tubes. 12 pages.

Corning Glass Works

Valvee

234B

tion as well as corrosion resistance from your plug valves. Cross-section and line drawings show unusual features of the line which ranges from sizes of ½ to 12 in. Data on working pressures, materials of construction, design and function, manufacturing methods, accessories, lubricants and pressure and temperature ratings.

H. K. Porter Co.

Plasticizors 2260

varied applications using your choice of 12 plasticizers offering a wide choice of properties. Graphical and tabular comparisons of such projecties as volatility, extraction resistance, low-temperature and electrical properties. Specific utility of the plasticizers in tinyl dispersions, nitrocellulose lacqueers, naturnal and eynthetic rubbers, and plasticizer emulsions. 7 è pages.

Carbide and Carbon Chemicals, Co.

Motors 236D almost any application. Photographs, diagrams and cross sectional drawings show specifications construction and dimensions of a wide variety of types. A series of loose-leaf builetins bound in one folder on various models in the company's line.

Steam Generators 236E

walkways and stack breechings with plant as-sembled package steam generators. Photographs, drawings and charts clarify sections on basic construction, range of capacities, control and in-strumentation. 20 pages.

Foster Wheeler Corp.

Solvent Extractors

company's countercurrent solvent extractor.
Working method is explained with the aid of a cross sectional diagram. Fields of application and advantages are listed. 4 pages. 236F

Wetsfalia Separator Co.

Construction

graphite as a solution to some of your construc-tion materials problems. Products in grades from porous to impervious for applications in the and electrical fields are described. Tables give physical characteristics and sizes on each prod-uct. 20 pages. 234G

National Carbon Co.

Resina

22611

of alkyd resins and hard gum for use in protective coating and printing ink industri Characteristics, solubility, compatibility a recommendations for use.

Alkydol Laboratories, Inc.

Filtration

lower cost by taking advantage of the structural simplicity and absence of moving parts featurable by this company's filter press. Various phases of the filtering operation (method of slurry feed and filtrate discharge, drainage surface of plately with the aid of photographs and drawings. 28 pages. 2361

T. Shriver & Co.

Air Conditioning 2263

company's line of heating and air conditioning systems. Teres descriptions, cutaway drawings, products and parts photographs, construction features and condensed tables summarising the range of capacities, sizes and dimensions on each line. 38 pages.

Trane Co.

Heating Colls 226K

ficiency and durability through the use of this company's standard colls which feature a solder-less bond. Capacities, selection, performance, installation and dimension data. 68 pages.

Trane Co.

Controllers

electric contact units offering temperature and pressure control and safety cut-off. Photographs, wiring and dimension diagrams. 16 pages.

Minneapolis-Honeywell Regulator Co.

236L Steam Plants 22536

water columns and gages. Series of phantom drawings show differences in the construction and operation of various members of the line. Chart gives dimensions and prices. 20 pages.

Yarnall-Waring



FILLING THE BILL

NIALK® products...specially developed and quality-controlled to meet the exacting demands of industry

NIALK

NIALK

NIALK

NIALK

ALL ALLA

NIALK

NIALK

NIAGATHAL®

Liquid Chlorine

Caustic Potash

Carbonate of Potash Paradichiorobenzene

Caustic Soda'

TRICHLORethylene

(Tetrachloro Phthalic Anhydride)



NIAGARA ALKALI COMPANY

60 East 42nd Street, New York 17, N. Y.

piping brother

piping brother

presion

patrasion

prictional

prictional

presiotance

presiotance

presioty

precify

precify

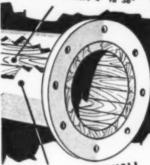
precify

precify

precipy

Combines the strength of steel with the durability of wood. Ideal for corresive liquids and gases including aggressive waters, industrial waste liquors, acid, other wasters, and stations for service up to 180° F and 250 p.s.i. Higher pressure ratings for special service requirements. All pips flanged and available in 10° and 20° standard lengths or "trainer-made" to your specializations. Easy to suit and refluence. All flanges have standard ASME bull circle.

INNER WOOD LINING



OUTER METAL SHELL

Wood-lined tittings in standard and special designs for all diameters. For catalog and additional information, write Dept. CE



MICHIGAN PIPE COMPANY

What's New In . . .

How To . . .

Company Cambridge Corp.

Air Filter

smoke, fumes, apores, radioactive particles and other microscopic foreign matter from the air. Description and specifications of new filter produced in five sizes from 15 to 350 cfm. 4 pages.

Fork Trucks

dling of materials by properly exploiting the construction features of this company's line of fork lift trucks. Closeup photographs have exactly how the arious parts operate and fit together. Se pages.

Townstor Corp.

Steam Generators 238C tions by taking advantage of the fiexibility and simplicity in design offered by this company's WA-Series steam turbine generator units. Cross section views of each of the turbine types (condensing, non-condensing, automatic extraction) are shown. Also there are cross sections of the steam turbine generator unit, of the construction and a cutaway view of a housing type generator showing spiral air flow in the stator. 8 pages.

Allis-Chalmers Mfg. Co.

alves

order a valve. Sections on data required when you ordering manually operated valves, power-operated valves, instrument operated valves, pressure and temperature regulators, traps and level controllers, relief valves and check valves.

Cooper Alloy Foundry Co.

Instruments 238E

graphic panels with these strip chart recorders which eliminate back-of-panel adjustments. Several views of the recorders, dimenson and application drawings. 6 pages. Minneapolis-Honeywell Regulator Co.

Vacuum Equipment complete vacuum processing systems. Specification tables for such equipment as rotary and rotating vacuum dryers, vacuum shelf dryers, freese dryers, impregnators, extraction and solvent recovery apparatus and vacuum pumps. 12 F. J. Stokes Machine Co.

Pollution 238G pages.

. . . take advantage of the research in air and water pollution being done by this group. Describes its work and facilities. §

New York University College of Engineering

Pumpa 238H pump operation to perform a wide variety of pumping operations for which mechanical pumps are not suitable. Photographs, construction and dimension drawings, tables giving capacity and performance factors on ejectors, eductors, exhausters, syphons. 20 pages. Penberthy Injector Co.

Strainers

processes possible with pipeline strainers in an all purpose line ranging in sizes for % to 36 in. Discusses factors to consider in selecting type and size of strainer for a specific application, and the effect of flow rate, screen loading and the viscosity of fluid on pressure drop. 16 pages.

J. A. Zurn Mfg. Co.

Antioxidants

rubbers as well as related hydrocarbon-like polymers with di-tert-butyl-para-cresol. Simple directions for preparation of aqueous dispersions. 3 pages.

Koppers Co.

Diesters 238K at extremely low temperatures through the use of two cesters of azelaic acid and the dibutyl ester of di-linoleic acid. Properties and applications. Charts compare them with other diesters. Temperature and viscosity curves.

Emery Industries

Valves 23aL

satisfy your needs for valves for boller services such as surface blow, bottom blow-off, water column blow-off and connections. Complete specifications, materials of construction and dimensions of types for these purposes. Sketches show details of design. Sectional and exploded views. 22 pages.

Everlasting Valve

Tube Fittings they're supposed to do. Complete dimensional information, cross section drawings, installation recommendations and assembly instructions. Pictures of the entire line available in brass, aluminum, steel, stainless steel, and Monel. 12 pages.

Crawford Fitting Co.

Instruments

gedness in indicating pyrometers and resistance thermometers. Wiring diagrams and circuit information of pyrometer, resistance thermometer, tachometer and other actuations. 8 pages.

Minneapolis-Honeywell Regulator Co.

Welding Rods 238P and build up worn surfaces with bronze rods.
Welding techniques discussed include the oxyacetylene torch, metal-arc, carbon-arc and inert-gas-shielded arc. Tabular data on copper and copper alloy welding rods. 24 pages.

American Brass Co.

Dryors 2380

drying operations with the right rotary dryer. Large cutaway views as well as cross section views of four models. 8 pages.

Hardinge Co.



Check what the users say against the **Benefit Points Below**

 A Rubber Goods Manufacturer says—
"We have used these Type '1000' valves for "We have used these type 1000 valves for several years with fine results on air or water service at pressures from 10 lb. to 300 lb. depending on requirements. These valves as claimed have been found to have LARGE CAPACITIES. On FLUCTUATING LOADS or STEADY LOADS they are MOST DEPENDED. ABLE, RAPID IN ACTION with a QUICK DEMAND and TIGHT CLOSING when the load drops off. They require but a MINIMUM OF SERVICE OR MAINTENANCE."

· A Chemical manufacturer says-

"The CASH STANDARD Type '1000' valves which we have in service have fulfilled the conditions checked . . . (ACCURATE PRESSURE CONTROL UNDER TOUGHEST WORKING CONDITIONS), (TROUBLE FREE SERV-ICE), (TIGHT CLOSURE) better than any other steam pressure reducing valves that we have used."

WRITE FOR BULLETIN 962





· A Metal Products company says-"We have had a number of your CASH STANDARD Type '1000' valves in operation in our plant for a number of years. These valves have proved to be satisfactory in every respect. We particularly like this type of valve because it is SIMPLE TO INSTALL, REQUIRES A MINIMUM OF MAINTENANCE, and gives CONTINUOUS and UNIFORM PRESSURE CONTROL.

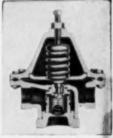
· A Plant Engineer says

We find that the CASH STANDARD Type 1000' streamlined valves are best suited for our various applications of compression meld-ing because of their VERY WIDE RANGE OF ACCURATE PRESSURE CONTROL. The simplicity of construction of these values has kept the MAINTENANCE COSTS VERY LOW which of course means a SAVING IN COST OF OPERATION, and SPEEDIER PRODUC-TION.

- Maximum capacity when needed most,
- Accurate pressure control under toughest working conditions.
- Trouble-free service.
- Smooth operation.
- Tight cleaure.
- Speedier production results, Elimination of follures, 4.
- Cost-saving operation,
- No spollage. Practically zero, in maintenance.

A. W. CASH COMPANY DECATUR, ILLINOIS

BULLETINS AVAILABLE ON OTHER CASH STANDARD VALVES Send for them



Bulletin 950-inches the CASH STANDARD Type D Single Seat Pres sure Reducing and Regulating Values for use with most fluids. Shows simple inner working parts that save in maintenance. Diagram explains how volve works. Bluoprint simplicity of installation.



STANDARD Type 4030 Back Presi Valve - designed to automat maintain a constant pressure in evaporator corresponding to a stant temperature desired. Shaws mmonia and Freen Gas Capacity Chart based on ABSOLUTE press



Bulletin 946. STANDARD Self-Contained, Pilet Operated Type 10 Pressure Reducing and Regulating Valve for use with water or air; with any gas or all that is non-corrosive; and with refrigerat-ing fluids such as Ammonia and Freen. Meny interesting particulars explained such as: how valve works, tight seating, large aspecity, no waste, no water hammer or chatter,



Modern Paperboard Plant

At Antioch, Calif., Fibreboard Products has put into operation a new kraft pulp and paperboard mill.

The mill has two modern machines; one is a Fourdrinier unit and the other a cylinder machine. Capacity is 250

tons per day of kraft and semi-kraft paperboard.

Operations at the mill are divided into two phases. One is the use of logs as raw material, which goes into the production of bleached or unbleached kraft. The other is based on the use of chipped wood, plus "box ends"—waste wood from box factories. The product in this operation is semi-chemical 9-point corrugating material.

Logs are picked up by a 50-ton crane. They leave the cutoff saw with a maximum length of 20 ft. and are then

Logs are picked up by a 50-ton crane. They leave the cutoff saw with a maximum length of 20 ft. and are then sent to the hydraulic barker, where water issuing from the movable nozzle at 1,200 psi. quickly knocks off the bark. Logs less than 40 in. dia. then go to the chippers, while the larger ones are reduced to 40 in.

Chips are reduced to 1 in. size then passed over reciprocating screens, where the fines are collected for processing into semi-chemical pulp. Any chips larger than 1 in. are reduced to size in a crusher. They are carried on a rubber belt conveyor to the digester room.

Each of the three digesters is lined with stainless steel and is 50 ft. high and 11 ft. in diameter. By using a stainless lining, the shell thickness was made materially less than would have been required by the usual all-carbon steel construction, with a resulting saving in cost. Digesters are heated by shell and tube heaters, and are equipped with automatic cooking controls. Cooking time is about 3 hr. at 110 psi.

Effluent from the digesters is blown down into a common cone-bottom blow tank. Vapors from this tank are passed through a jet condenser heat recovery unit, which furnishes fresh hot water for washing.

Pulp from the digesters is pumped from the blow tank to a four-stage washing system. Here the black liquor is removed from the pulp. The pulp is screened over six rows of flat diaphragm screens, and the screened stock is then thickened over a decker. The pulp may go either to the machine for making unbleached board or to the bleaching plant.

The bleaching plant is a four-stage system in which the pulp is subjected to (1) low-density chlorination, (2) high-density caustic extraction with a low-density soak in the caustic stage, (3) high-density treatment with calcium hypochlorite, (4) a second high-density calcium hypochlorite treatment. A water wash follows after each stage except between the two hypochlorite stages. About eight percent chlorine, on the basis of dry pulp weight, is used. Some 60 percent of it is used in stage (1) and 40 percent is in the form of calcium hypochlorite used in the two hypo treats. About 2.5 percent sodium hydroxide (basis dry pulp) is used in the caustic treatment.

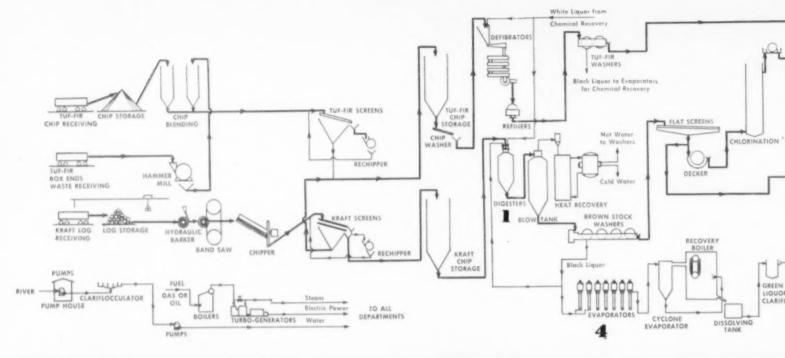
The cylinder machine for handling the unbleached or bleached pulp has six vats of overflow, uniflow type, with automatic level control and hydronamic inlets. Three primary presses and three main presses are used. The first and third main presses are plain; the second main press is of the reverse and suction type. All valves on the machine are motor operated by remote control from a central board. All piping is either stainless or lined with synthetic rubbers or resins.

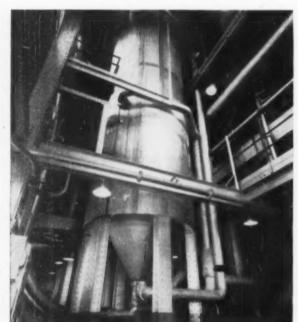
In the semi-chemical operation, a portion of the raw material is chipped wood. This is combined with chips from waste wood from box factories. The chips are washed and dewatered, then charged into three reaction chambers operated at 150 psi. The chemical composition of the white kraft cooking liquor is 80 percent sodium hydroxide and 20 percent sodium sulphide. Strength of the liquor is about 6 lb. of Na₂O equivalent per cu. ft. of colutions

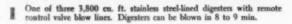
The cooked chips pass by a screw feeder from each reaction chamber to an Asplund disc defibrator, then are discharged through a blow valve. The raw stock is thereafter washed with fresh water in a two-stage system. In the refiners the fiber is hydrated in passing between a 42 in. steel disc rotating opposite a fixed disc. Part of the fiber is returned for further refining, and the remainder, containing about 3.5 percent water, is moved by centrifugal pump to the chest of the machine.

Black liquor from the reaction chambers is combined with that from the digesters in the mill; the mixture is concentrated to 50 percent solids content in a six-effect evaporator. The concentrate, with sodium sulphate added, is pumped into a cyclone evaporator, and the product is then sprayed into a recovery furnace for combustion of the organic matter. The furnace generates 100,000 lb. per hr. of 600 psi. steam. Gases of combustion pass through a Cottrell precipitator. The molten stream of sodium carbonate and sodium sulphide flows by gravity from the furnace to the solution tank.

The water solution is pumped to a causticizing system where the sodium carbonate is combined with slaked lime to produce caustic soda and calcium carbonate. Calcium carbonate slurry is filtered and washed, the filtrate being "white liquor" which is then returned for further use in the reactors and digesters. The filter cake is calcined for the recovery of the lime.

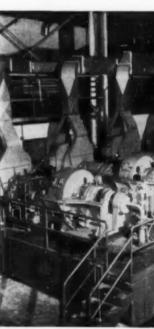




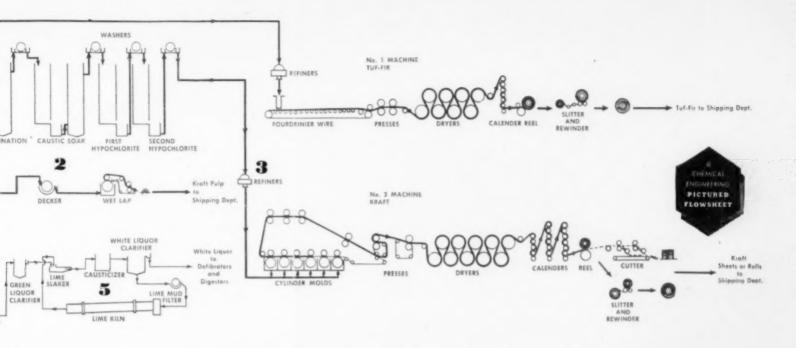




View of bleach and wash plant. In foreground are the chlorination stage washer, caustic stage washer, and first hypo stage washer.

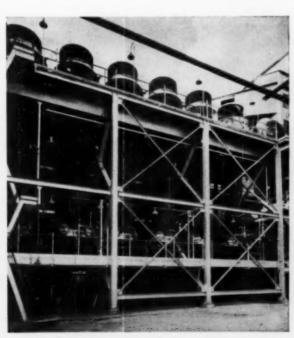


View of the refiners, where the fibe a 42 in. steel disk which is rotating of





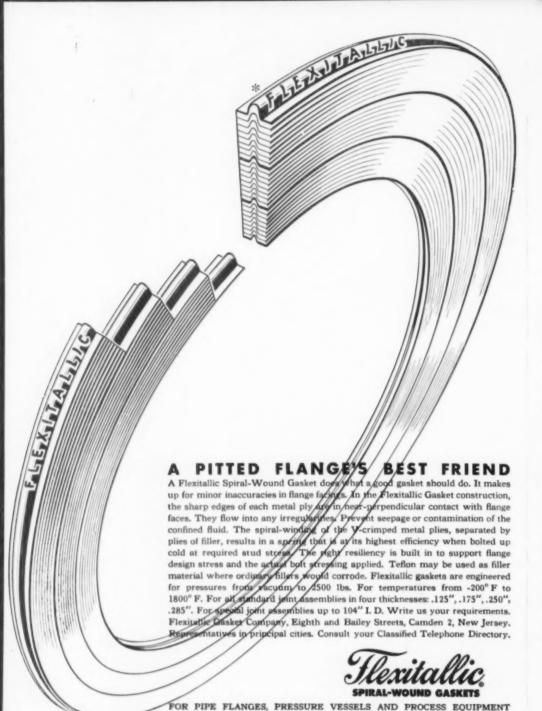
the fiber is hydrated in passing between tating opposite to a fixed disk.



Sextuple effect, fin-type evaporators for concentrating black liquor from the reaction chambers and digesters to 50 percent solids.



Causticizing plant where sodium carbonate and sodium sulphide are combined with slaked lime to produce caustic and calcium carbonate.



How to Reduce High

in corrosive process piping,

for example

THE INSTALLATION

SUI

Mos

AV

TH

Crane 1

Valves,

subject

insures

diaphra

prene d

fully Ne

Catalog

On steepwater solution lines to steam-heated steeping tanks at American Maize Products Co. plant, Hammond, Ind.

THE HISTORY

This plant had a problem of continual nuisance and cost of frequent valve re-packing. The valves then being used in steepwater lines were subject to constant leakage and rapid wear under exposure to the weak acid vapors present in the steeping process.

The problem was solved by replacing with Crane Iron Body Packless Diaphragm Valves. Even after 4 years' continuous service, these Crane valves required not a penny's maintenance cost—showed no leakage, no sign of corrosion, erosion, or undue wear. Already, Crane Diaphragm valves have given more than double the repair-free service obtained from any other valve used.

The Complete Crane Line Meets All Valve Needs. That's Why,
More Crane Valves Are Used Than As

RANE VAL

CRANE CO., General Offices: 836 S. Michigan Ave., Chica Branches and Wholesalers Serving All Industrial A

VALVES . FITTINGS . PIPE . PLUMBING

CHEMICAL ENGINEERING—February 1952

February 1952—CHEMICAL ENGINEERING

*Not all spiral-wound gaskets are Flexitallic Look for the name FLEXITALLIC stamped into the metal spiral of every genuine Flexitallic Gasket. Look for Flexitallic Blue in gaskets with asbestos filler.

ligh Valve Costs

VALVE SERVICE RATINGS

SUITABILITY:

Packless feature good

MAINTENANCE COST:

none in 4 years

CORROSION-RESISTANCE:

no sign of Corrosion

SERVICE LIFE:

no sign of wear -looks indefinite

OPERATING RESULTS:

Excessive costs eliminated

PRICE:

moderate-much less than alloy values

AVAILABILITY:

Stock item in Crane line

THE VALVE

Crane No. 1611 Iron Body Packless Diaphragm Valves, featuring separate disc and diaphragm design. Diaphragm used to seal bonnet and stem only; is not subject to crushing and rapid wear. Separate disc

insures positive seating even should diaphragm fail. Available with Neoprene diaphragm and disc insert, or fully Neoprene lined. See your Crane Catalog or Crane Representative.

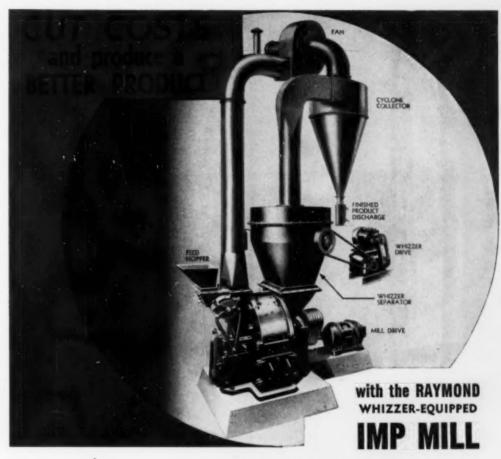
Than Any Other Make!

LVES

e., Chicago 5, Illinois Instrial Areas

ING . HEATING







For complete details, ask for Raymond Imp Mill Catalog No. 67. This compact pulverizing unit provides an economical installation for handling a variety of fine grinding operations in the chemical and process industries.

The Imp Mill combines pulverizing, separating, and conveying in one complete Unit. This saves costly re-handling of materials, eliminates separate units of equipment, shortens process time, and provides a clean, dustless, automatic operation.

Whizzer separation gives a wide range of fineness control by one simple adjustment and it maintains a constant, uniform product. Flash Drying accessories remove initial moisture simultaneously with pulverizing, and other further economics in handling materials that contain moisture in their crude state.

If you are making high specification materials, the Imp Mill offers important advantages in production.

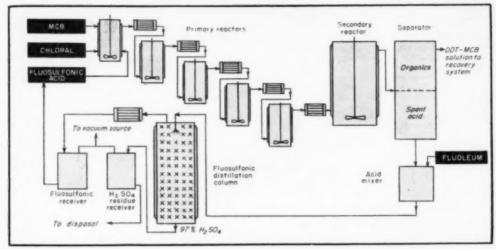
COMBUSTION

1311 North Branch St., Chicago, 22, Illinois

246

EGNEERING—SUPERHATER, INC.

Principal Cities



FAST REACTION features new process; these five 7-gal. primary reactors can make 20,000 lb. of DDT daily.

DDT Eyes Fluosulfonic Process

Naugatuck's new continuous DDT process uses fluosulfonic acid instead of sulphuric. Results: less capital investment, lower production costs—and higher yields.

DDT producers are now eyeing a new process. And it's one that may well pan out to be the most radical departure in production methods since Zeidler made his classic synthesis in 1874 and large-scale output began in this country in 1943.

The new process hinges on using fluosulfonic acid instead of sulphuric as the dehydrating agent to force the DDT-forming reaction between chloral and monochlorobenzene. It was developed by Naugatuck Chemicals Division of Dominion Rubber Co., Ltd., at Elmira, Out.

Fluosulfonic acid, Naugatuck engineers found out in pilot plant work, could slash the reaction time to a mere 20-30 min. The usual sulphuric process takes 10-14 hr. without refrigeration, 5-6 hr. with it.

Speed-up Results—This speeded-up reaction rate, in turn, gives several clear-cut advantages to the fluosulfonic process. Here is what Naugatuck's engineers say the process does:

 Hikes the reactor productivity output per unit of volume—some 30fold; this allows an extremely small, compact reaction setup.

 Reduces to almost zero the formation of byproduct p-chlorobenzene sulfonic acid.

• Cuts down by close to 80 percent

the spent sulphuric acid that has to be recovered or disposed of.

• Lowers overall sulphur consumption by 75 percent.

• Gives an estimated savings of 20 percent on equipment investment for a new plant.

 Jacks up DDT yields, based on chloral, by 10 percent.

 Cuts overall manufacturing costs by an estimated 5-6 c. per lb.
 But against these bonuses, Naugatuck had several major problems to

tuck had several major problems to overcome: corrosion of materials of construction, high cost of the fluosulfonic acid, safety hazards.

One of the biggest of these was cost of the acid itself. Several years ago Dominion Tar & Chemical prepared DDT from fluosulfonic, but the experiments were on a batch basis. Interest was aroused, but U. S. producers weren't enthusiastic about the prospects of getting low-cost fluosulfonic.

Then a team of Naugatuck chemists and engineers tackled the problems in cooperation with the Research Laboratory of Dominion Rubber at Guelph. Together they made the process continuous, worked out the proper mole ratios for reactants and operating conditions.

More important, though, they de-

veloped an economical way to recover the fluosulfonic acid. Now Naugatuck engineers are firm in their belief that the economics that have developed more than offset the initial high cost of the acid. Their belief is borne out by the keen interest already shown in the improved process since it was first announced in early December (Chemical Week, Dec. 1, p. 29).

Research was actually completed over two years ago. Although Naugatuck—Canada's only producer of DDT—did not put up a commercial unit to use fluosulfonic, it did turn out several thousand pounds in extended pilot plant runs. Meanwhile, the company was able to size up the new process against its own commercial sulphuric process. As a result, Naugatuck plans to use its fluosulfonic method if it decides to expand production facilities.

Meanwhile, the company has established its patent position* and is now ready to consider licensing the process, says M. F. Anderson, general manager of Dominion Rubber's chemical, latex and reclaim division in Montreal.

▶ Key Steps in Process—As in the conventional DDT process, Naugatuck's method hinges on the condensation of chloral and monochlorobenzene. But it uses fluosulfonic instead of sulphuric-oleum as the dehydrating agent, and is continuous.

Here is how the process works, as described by C. W. Gates, manager of

Canadian Patents 449,650; 449,651
 449,652; U. S. Patents 2,447,326 and 2,447,476. Other patents pending.

Naugatuck's development department at Elmira. This description is based on a plant estimated to turn out 20,000 lb. of DDT per day or 500,000

lb. for a 25-day month.

Monochlorobenzene and chloralin a mol ratio of 8:1-are fed through proportioning pumps and mixed in a 250-gal. vessel, then sent to a 700gal. feed tank. Fluosulfonic acid is fed through a separate line into a 1,000-gal. feed tank. The ratio of fluosultonic to chloral is 4.5:1 (in the HSO oleum process the ratio of HSO, to chloral is about 7.4:1).

The two liquids are then fed continuously and simultaneously into the first of the five agitated and jacketed reactors (see flowsheet). Reaction temperature is kept at 32-50 deg. F. (60-85 deg. in the sulphuric process). The mixture flows continuously through the five 60- sq. ft. coolers and 7-gal. primary reactors. Refrigeration for reactor jackets and coolers requires

a 30-ton unit.

These reactors can be made of aluminum or stainless steel; the conventional DDT process usually requires glass-lined equipment. Thus its materials of construction are relatively cheap and available.

Seven-Gallon Reactors-With fluosulfonic acid as dehydrating agent, the reaction between chioral and MCB is almost instantaneous; thus the size of the reactors can be astound-

ingly small. Naugatuck engineers actually found the holding time in each of two reactors to be 10 min. This total of 20 min. compares with 10-14 hr. by the conventional oleum process without refrigeration or 5-6 hr. with refrigeration.

Thus it is possible, Gates points out, to react 19,200 lb. of DDT per 24 hr. in only two 50-gal. (Imp.) reactors. A productivity of 8 lb. of DDT per Imp. gal. of reactor space is 20-30 times that of the conventional H.SO.

oleum process.

To be conservative, Gates bases his estimates on five 7-gal. (U.S.) primary reactors plus one 125-gal. secondary reactor. He estimates that these can turn out 20,000 lb. of DDT

per 24-hr. day.

The excess MCB-with DDT in solution-overflows continuously from the separator. It can be worked up by any conventional procedure, such as batch washing and steam distillation to recover MCB and yield molten

However, Naugatuck has worked out in the laboratory a continuous DDT washing and MCB distillation procedure that looks attractive for commercial use. This would put the entire process-reaction, acid recovery, washing, distillation and product flaking-on a continuous basis. This continuous set-up has many advantages over batch treatments, Gates points

DDT made by the fluosulfonic process should be washed in ordinary leadlined washers instead of glass equipment: the wash waters have a small

amount of HF.

The process yields a technical-grade DDT with the standard 89 deg. C. setting point. The product passes standard U. S. specifications.

▶ Key to Economics-Recovery of the spent acid is the economic key to the process. Naugatuck has worked out an inexpensive method that keeps fluosulfonic losses to 10 percent or less.

In the formation of DDT, fluosulfonic reacts with the liberated water to form H₂SO, and HF. Actually, the spent acid from the separator contains HSO, and fluosulfonic with HF in

solution.

Spent acid goes to one of two 1,000-gal. agitated mixers where 50 percent fluoleum (a 50-50 mixture of fluosulfonic and SO, is added to convert the HF to fluosulfonic; SO, alone can also be used.

After treatment with fluoleum, the spent acid is distilled in a packed tower by flash vacuum distillation; the tower is 10 ft. high and 3 ft. in diameter. After being condensed, this recovered fluosultonic is returned to the

The acid recovery column should be built of stainless steel or aluminum to resist corrosion. Otherwise there may be a safety hazard, since it operates under 28 in. of Hg vacuum at 140-150 deg. C. and requires 60 psi

steam on the jacket.

Acid residue from the distillation column is 97 percent H₂SO₄, with a trace of p-chlorobenzene sulfonic acid, about 2 percent organics and 1 percent fluoride chemicals. In contrast, residual acid from the sulphuric-oleum process contains about 80 percent H₂SO₄, 18 percent p-chlorobenzene sulfonic acid and 2 percent organics.

More important, though, the

amount of acid for waste disposal from the fluosulfonic process is only about 17 percent that from the sulphuricoleum method. This can be an important factor for plants with waste disposal problems or limited facilities. ► Lower Raw Material Costs-Naugatuck yields were high. Based on chloral, yields have run up to 97-98 percent-about 10 percent above those of the sulphuric-oleum process. Based on MCB, they have been up to 80

Gates, however, has figured out raw

material costs on conservative yields of 95 percent on chloral and 75 cent on MCB. The raw material factors per pound of DDT then become 0.437 lb. of chloral; 0.848 lb. net chlorobenzene; 0.694 lb. net 50 percent fluoleum; 0.100 lb. of soda ash.

Raw material costs then tally up to a little less than 20 cents per lb. of DDT. However, recovered acid credits (0.212 lb. fluosulfonic at 4 cents and 0.274 lb. sulphuric at 0.3 cent) cut the net raw materials costs to 19

cents per lb.

Gates estimates that Naugatuck's process can show a raw materials saving over the commercial sulphuricoleum process of 4.5-5.5 cents per lb. of DDT. He places the overall manufacturing cost saving at 5-6 c. per lb. Energy and water needs of the fluo-

sulfonic process are estimated as follows, per 100 lb. of DDT: 780 lb. of steam; 3,600 gal. of water; 15 kwh.

Lower Plant Investment-On the

basis of a unit to produce 1,000,000 lb. of DDT a month, Gates figures that raw material storage and transfer equipment would cost about \$57,000 for the sulphuric process and \$41,000 for the fluosulfonic.

On the same basis, he places the cost of reaction equipment (including refrigeration) at close to \$164,000 and \$112,000 respectively. Cost of facilities for acid recovery were estimated at \$90,000 and \$106,000-the fluosulfonic cost being higher.

Thus the total equipment costs for complete units came to \$259,000 for fluosulfonic and \$311,000 for sul-

The fluosulfonic process needs less floor space for its reaction equipment but more for its acid recovery unit. The total floor area would be about the same for either process.

► No Hazards Now-Since a flesh burn with fluosulfonic acid combines the effects of H,SO, with those of HF, the handling, use and recovery of fluosulfonic is more of a safety hazard than HSO, and oleum.

Naugatuck engineers believe they have licked this problem by the use of very small reactors and the development of a continuous, instrumented

and controlled process.

Dangers from corrosion have been solved by using readily available corrosion-resistant materials of construc-

tion such as aluminum.

All in all, Naugatuck is confident that its continuous fluosulfonic process is ready to be commercialized and that it has clear-cut advantages over the present sulphuric method, especially for new DDT units. Meanwhile, several U. S. firms are taking a close look at it.



Century Gear motors are available in a wide range of types and sizes from ½ to 50 horsepower—in a variety of speeds. Other Century motors are available in a complete range of types and sizes from ½ to 400 horsepower. Specify

Century motors for all your electric power requirements.

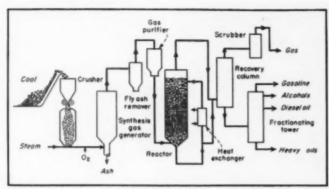
I to 50 horsepower, vertical all motor type gear motor.

2 to 3 HP gear meter Single gear reduction

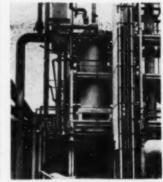


ts in Principal Cities





PROCESS, greatly improved, has come a long way from German techniques.



REACTOR licks major catalyst problems.

Fischer-Tropsch Makes Progress

Latest news in synthetic fuels from synthesis gas is the successful operation of the improved Bureau of Mines demonstration reactor at Louisiana, Mo.

The U. S. Bureau of Mines recently took the wraps off of its improved gassynthesis (Fischer-Tropsch) reactor, key unit in the brand new gas-to-oil demonstration plant located at Louisiana, Mo.

In converting carbon monoxide and hydrogen to oil, the new reactor solves the problems of (1) cooling the iron catalyst, (2) preventing the catalyst particles from cementing together.

particles from cementing together.
First problem is solved by use of a high boiling-point oil. Second solution is speeding up the flow of gas and oil enough to lift the bed of catalyst particles and keep them whirling.

► Capacity Is Higher—The new reactor requires less steel, is simple to construct and has six to eight times the capacity (per unit volume) of the former German reactors. Besides, it can be built to turn out 1,000 bbl. or more of oil a day.

Briefly, here's how the improved unit works:

Purified synthesis gas is introduced through a point near the bottom of the reactor. At the same time, the catalyst, immersed in a high boiling-point oil, is shot into the bottom of the unit under sufficient pressure (together with the synthesis gas) to produce a jiggling catalyst bed. The gas traveling through the reactor is converted into synthetic hydrocarbons, then drawn off at the top. Meanwhile, the oil is continuously circulating from the top of the reactor, through a heat exchanger where it is cooled

down, then into the bottom of the reactor again (see flowsheet).

The Bureau is pushing gas synthesis as a route to synthetic liquid fuels along with coal hydrogenation and processing of oil shale.

PTests Pan Out—A few weeks ago, Oscar L. Chapman announced the end of the second shakedown run at the Louisiana, Mo. plant. This successful run lasted 25 days, produced more than 52 million cubic feet of synthesis gas from more than 700 tons of coke and 450 tons of 95-percent oxygen. Although coke was used for the test runs, the Bureau intends to use coal eventually.

During the test, the reactor proved itself by converting 75 to 85 percent of the synthesis gas to oil during a single pass. Bureau technologists point out that if the conversion can be raised to 90 percent, the process can be operated with a single conversion stage instead of the two stages formerly thought necessary.

The reactor has an inside diameter of 3 ft. and is about 20 ft. tall. Original diameter was 6 ft. for use with a fixed catalyst bed, but the greatly increased capacity of the jiggling bed cut this down. The unit operates up to 450 psi. and it sends, to the converter, synthesis gas containing well under 0.05 grains of sulphur per 100 cu. ft. This is less than half the 0.10 grains per 100 cu. ft. considered permissible for the process.

► Costs Are Cut—Other important process advantages are:

 The Bureau has developed a lowcost catalyst, composed mostly of waste mill scale.

 The process permits use of gas that has been made directly from coal.
 Before this, it had been necessary to boost the ratio of hydrogen to carbon monoxide to prepare synthesis gas for conversion to oil.

The plant also includes a 1-ton-perhr. Linde-Frankl unit to prepare oxygen for use in gasifying coal. Other important units are an oxygen-blown gas producer maintained as a substitute gasification unit, a synthesis gas purification unit for removing dust and sulphur impurities, and product recovery and refining facilities.

All of these technological improvements are helping to gnaw away at the high cost of gas-to-oil synthesis, number one deterrent to its industrial adoption.

Largest Forest Project Planned in British Columbia

It was the first time big industry bypassed coastal timber stands. A \$65 million kraft pulp and newsprint project, the largest single forest project ever undertaken in British Columbia, will soon be underway in the Arrow Lakes region of the province's interior.

B. C. government, who fostered the move, plans to decentralize industry and build up the economy of the interior. Celger Development Co. Ltd., a Celanese Corp. of America affiliate, will handle the undertaking. They expect to be operating in two years, depending on the availability of steel.

The mill will turn out 400 tons daily of bleached and semi-bleached sulphate pulp and 275 tons of newsprint. Plans for a plywood mill are being considered, and will be completed if sufficient peeling timber is found.



EXPERIENCE IS A GREAT TEACHER!

Ever build a boat in a basement? The forlorn fellow in the illustration will assure you it's a frustrating experience.

But . . . lessons learned through experience are long-lasting and in the final analysis add up to "know-how."

Combine Brown & Root's thirty-eight years of experience with a loyal, alert, and virile organization and you have a combination that can't be matched. Brown & Root's list of satisfied clients, particularly in the great Southwest, is impressive. If you are planning a new plant in the petro-chemical or heavy industry field, you can save money and grief by conferring with a Brown & Root expert. Brown & Root can do a turn-key job, from plant location and engineering to the finished product.



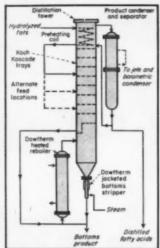
BROWN & ROOT, Inc. Engineers - Constructors

CABLE ADDRESS - BROWNBILT

Associate Companies:- BROWN ENGINEERING CORP.

BROWN & ROOT MARINE OPERATORS INC.





CONTROL instruments feature this . . .

FATTY acid distillation unit where . .

One Man Runs Packaged Plant

New fatty acid distillation unit features packaged design and automatic control. It has a capacity of 12 tons daily, cost less than \$10,000 per daily ton of feed.

Recent developments in the chemical industries highlight a sharp trend toward "packaged plants"—small, compact, self-sufficient units designed to operate at a profit with a small output. They are characterized by a streamlined design that pares both construction and operating costs to the bone.

Now the packaged plant idea has been carried over into the fatty acid industry, and a new packaged distillation unit has recently gone on stream at the London, Ont., plant of S. F. Lawrason & Co., Ltd. It is now turning out high-quality distilled fatty acids of exceptional light color.

Lawrason's unit uses continuous distillation under vacuum. The feed is hydrolyzed animal and vegetable fats from which glycerine has been separated. When used to remove color bodies, the unit has a charging rate of 1,000 lb. per hr.

"Turnkey" cost of the complete unit (including Dowtherm system, jets and barometric condenser) was below \$10,000 for each ton per day of feed, this is based on a daily charging rate of 12 tons. Units designed for larger capacities would naturally have a lower ton-day cost.

Complete engineering, construction and initial operating services for the new unit were furnished by James P. O'Donnell Engineers, New York (formerly Project Engineering Co.). Petro-Chemical Construction Co., Ltd., a Canadian affiliate, was contracting agent. Marshall-Moorman Development Co., New York, was process consultants.

▶ One Man and Controls—Since the unit is designed for automatic control, only one operator per shift is needed to operate it.

This emphasis on automatic instrumentation pays off, O'Donnell believes, for the unit has already shown that it can operate at a steady distillation rate of 1,000 lb. of crude acid charge per hour.

Process variables continuously recorded on a central control panel (see cut) are: (1) temperatures of tower top vapor, overhead liquid product leaving the separator, reboiler vapor entering the tower, feed after pre-heat, Dowtherm vapor entering the reboiler, cooling water entering the product condenser; (2) quantity of feed to the unit; (3) vacuum at the tower top.

Instrumentation control is also provided by locally mounted indicators for flow, temperature and pressure.

Automatic liquid level control regulates the flow of overhead distilled product from the separator and of bottoms from the distillation tower.

▶ Design Is Packaged—Engineering design of the unit kept capital investment as low as feasible: (1) the layout needs a minimum of space; (2) special design tricks cut down field construction costs.

Thus the cost, as well as the throughput, was kept in a range that would appeal to small or average size producers of distilled fatty acids.

Construction costs were kept down by designing a "packaged" type unit. A low limit was set on the maximum weight of any single component of equipment so that it could be transported by a truck, if necessary. The unit was put up by local contractors using ordinary construction equipment.

Koch Kascade trays are used because of their high tray efficiency and low pressure drop. They are designed so that each tray can be put in or taken out as a single unit in the field. This did away with the need for special hoists and handling space above the tower.

Special flanged vapor connections for the reboiler and product condenser were shop-welded to the distillation tower before shipment. This made field erection of the vertical reboiler and condenser a simple matter of setting them on supports and then bolting to flanges on the tower vapor connections.

Top of the tower was designed with a removable flanged cover to which the internal feed pre-heat coil was pre-fabricated. This design feature also simplified field erection. Besides, the removable top makes it easy to get to and maintain the trays and other tower internals.

As most of the feed stocks are corrosive, the distillation tower is made of Type 316 stainless. All other process equipment, including pumps, are made of stainless if they come in contact with process streams at temperatures which accelerate corrosion. For the same reason, special gaskets are used in all process pumps.

used in all process pumps.

Description Is Flexible—Lawrason's new unit is also characterized by operating flexibility. Process variables can be changed to suit a wide range of charge stocks and end products.

Feeds normally used are hydrolyzed animal or vegetable fats from which glycerine has been removed. The end products are high-quality distilled fatty acids and fractionated products of high purity.

Charge to the unit is preheated in an internal coil by overhead vapors in the top of the distillation column. Feed may enter at any of three alter20 different ways to look at



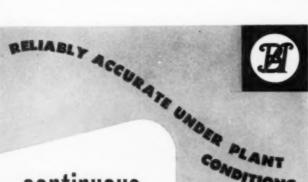




S CORPORATION COMMERCIAL S

. NITRO COMPOUNDS . SOLVENTS . PLASTICIZERS

CHEMICAL ENGINEERING-February 1952



continuous process-stream analysis

- trace monitoring
- separation control
- composition cost accounting
- synthesis control stream blending

Plant stream analysis by continuous infrared-absorption methods has proved itself to be a decisive factor in the success and efficiency of processes involving chemical, petro-chemical, and petroleum-derived streams.

The Baird Associates Plant Stream Analyzer has proved itself to be the instrument for the job; with high sensitivity, rapid response, rock-solid stability, explosion-proof design, complete reliability under the most rugged conditions, and adaptability to an unlimited range of applications.

Where are its potential uses? In any process industry where the concentration of an infrared-absorbing component in a process stream is a critical index of operation. All organic substances, and many inorganic ones, are infrared-absorbers.

What are its present, tested applications? We hold details of all applications in confidence, for our clients. But when we know your problem, we can tell you how to satisfy yourself about our claims before going further.

> We are staffed to understand your problem in your own terms - quickly and competently. Write us today.

Baird Associates, Inc.

33 UNIVERSITY ROAD

CAMBRIDGE 38, MASS.

News, cont. . .

nate points; this gives flexibility in the amount of fractionation on overhead or bottoms.

Bottom tray liquid is trapped out to a thermal-syphon type reboiler for heating by Dowtherm vapor. The Dowtherm unit is oil fired and is rated at 450,000 Btu. per hr.

The distillation tower is designed to operate at about 5 mm. Hg absolute at its top. Actually, pressures as low as 2 mm. have been obtained. A three-stage jet evactor and barometric condensers maintain the vacuum.

Bottoms are collected in a specially designed stripping section suspended from the bottom of the distillation tower. Stripping steam is fed into the bottom of this section and a Dowtherm-heated jacket surrounding it gives additional heat.

These two methods for providing stripping heat give more operating

flexibility.

The vertical product condenser and separator is of special design. The upper shell-and-tube condenser discharges condensed fatty acids into the direct-connected separator. They are then packaged and shipped.

New Coal Gasification Mimics Ore Reduction

A new process, similar to techniques used in reducing metal ores, converts sub-standard coal into gas. The process consists of a churning operation in fluidized beds of steam and oxygen. And it turns out a gas with the same Btu. content as manufac-

tured commercial gas.

The new unit, designed by Ralph
W. Moulton of the University of Washington's chemical engineering department, is 36 in. in diameter and 14 ft. high, uses 100 lb. of finely

ground coal an hour.

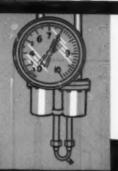
The process, however, is far from perfection. Further tests will be necessary over the next year or two.

Atomic Energy Commission Wants Chem Engineers

The AEC is no exception-like everyone else, it is short of engineers. Last month a hurried call went out from their Savannah River office for chemical, mechanical and metallurgical engineers.

Candidates who have past experience in atomic work are particularly needed. AEC is also interested in engineers with postgraduate work in nuclear science and industrial experience in allied fields. Salary range:

55,940 to \$9,600.



Make BSEB SAFETY HEADS Your Partners in Protection!

Unrestricted PRESSURE RELIEF Instantly

Pressure relief valves, long a standard for protecting pressure equipment, do a good job in ordinary pressure relief situations. But new products and processes of chemistry have complicated the problem of pressure protection by increasing the incidence of corrosion, gumming, rust, excessive heat and cold, and violent pressure surges. There are times when a valve becomes plugged up or corroded and fails to function properly, or where pressure builds up so fast that its relieving capacity cannot handle the load.

This new situation has caused the accurate, fast-acting BS&B Safety Head to become an indispensable partner for protecting modern pressure systems. When the rupture disc—a controlled zone of weakness—breaks, it leafs out, giving a full-throated, unrestricted opening.

The BS&B Safety Head, a patented pressure relief device, is designed to become an

integral part of any pressure system and consists of a preformed metal rupture disc (and a vacuum support, when required) that is held between two specially-machined flanges. The disc is designed to rupture at a predetermined pressure, and is guaranteed, when sold, to rupture within 5%—plus or minus—of its designed pressure at room temperature. By fabricating rupture discs from a wide variety of metals and using protective coatings, Safety Heads can be used with all types of gases or liquids at disc pressures ranging from 5 to 50,000 pounds per square inch.

As a primary relief device, the versatile BS&B Safety Head can be used in series ahead of a relief valve, or at valve outlet.

Solve pressure protection problems by having an experienced BS&B Safety Head Engineer analyze your relief requirements now.

Write today for your copy of the BS&B Safety Head Catalog.

BSEB

HEADS

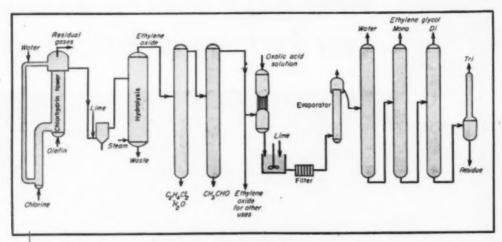
BLACK, SIVALLS & BRYSON, INC.

Safety Head Division, Dept. 2-N-2

7500 E. 12th Street

Kansas City 3, Missouri





Glycol Process Takes Hold Here

New California plant is adopting Belgium's flexible, low-cost ethylene glycol process substantially intact.

Hancock Oil is following the lead of British and Finnish companies in taking up an original Belgian process for ethylene glycol. Some major attractions are its low cost, flexibility and simplicity of equipment.

Construction has started on the \$4 million Hancock plant in Long Beach, Calif.; production is expected to begin early in 1953. Scientific Design Co., representing both the U.S. and Belgian companies, state that they will modify the process just enough to align it with American standards. Also, Hancock plans to operate some equipment outdoors while the Belgian plant is all indoors. An additional product of both new and old plants is ethanolamine.

Societe Carbochimique's original plant is at Tertre. They make their ethylene oxide from ethylene by the chlorhydrin method. Chlorine is dissolved in water to get hypochlorous acid in the lower column of a Haveg or brick-lined apparatus having two parts. In the upper, larger column or chlorhydrin tower, ethylene processed with hypochlorous acid forms a solution of ethylene chlorhydrin. After recirculation and reprocessing with chlorine, the solution is continuously taken off. Added water maintains a concentration of 60 grams of C,H,OCl per liter of solution.

Production of chlorhydrin per unit volume of reactor is especially high. The tower turns out, hourly, 75 g. of

pure compound per l. of teactor ca-

Mixing milk of lime with ethylene chlorhydrin at boiling temperature and atmospheric pressure accomplishes hydrolysis. Ethylene oxide boils off with water and some ethylene dichloride. After continuous distillation in two stages, the ethylene oxide is 99.7 percent pure.

Process Flexibility—With very simple apparatus dilute ethylene (as low as 20 percent) can be worked as efficiently as pure ethylene. Also, the process can be applied to propylene with the same yields. This is possible with the separate introduction of chlorine and olefin. In case direct oxidation to produce ethylene oxide should be substituted eventually for the chlorhydrin process, the plant could be used as is for the production of propylene derivatives which are growing in importance.

Ethylene glycols are produced by absorbing gaseous ethylene oxide in a dilute water solution of oxalic acid which acts as a catalyst. Absorption of ethylene oxide in the solution is practically complete. The oxalic solution is kept at 85 deg. C. Oxalic acid consumption is very low: 24 lb. per ton of glycols.

Water is added to obtain a 15 percent solution of the glycols: 88 percent monoethylene glycol, 10 percent diethylene glycol; 2 percent triethylene glycol. Addition of milk of lime at 90 deg. C. to the solution allows the catalyst to be filtered off as calcium oxalate. Thus removal of the oxalic acid is rapidly and quantitatively achieved. Removal of sulphuric acid used as a catalyst in many competing processes is only partial. Some always remains as a soluble complex which decomposes later in the distillation

Triple effect evaporators and distillation concentrate the glycol solution. The anhydrous mixture is fractionated in two columns and a batch still.

▶ And Simplicity—Because most of the process is carried on at atmospheric pressure, simple and cheap equipment can be used. Because the three-glycol solution is obtained practically free of impurities, it can be distilled without column corrosion, residue charring or clogering.

Hancock's California plant, like Carbochimique's, will alse produce ethanolamines. The Tertre plant makes them by the reaction of ethylene oxide and ammonia in aqueous solution at room temperature. The company has developed a process in which the proportion of amines formed can be varied and which permits preparation either of monochanolamine and triethanolamine without diethanolamine, or of DEA and TEA without MEA.

West May Have First Big Sulphur Mining Operation

Two previous attempts to mine the 3 million tons of sulphur-bearing conglomerate rock on the Beaver-Millard county line in Utah failed. Now Chemical Corp. of America is making the third attempt. If it pans out,

CLEAVER - BROOKS STEAM BOILER

Four-Pass

MEANS HIGH HEAT TRANSFER — GUARANTEED 80% EFFICIENCY



Cleaver-Brooks four pass construc-tion of the boiler. The four complete passes of combustion gases traveling through the entire tube length of the boiler proper enables the boiler to absorb the greatest practicable amount of heat from the fuel burned.

All Cleaver-Brooks boilers are of the four pass design and the maximum useable heat is absorbed in these four passes before the combustion gases leave the boiler.

Cleaver-Brooks steam boilers offer many advantages . . . quick, effortless response to fluctuating nomical in your area - oil or gas.

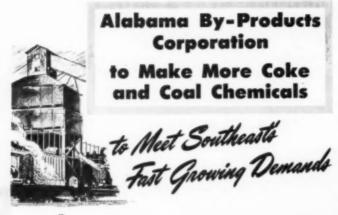
Remember the name Cleaver-Brooks, it stands for the first and finest in steam boilers. Standard models available in sizes from 15 to 500 HP, 15 to 250 psi, oil, gas, combination oil and gas fixing.

CLEAVER-BROOKS COMPANY
352 E. Kaefe Ava., Dayt. B. Milwanies 12, Wh.
Builden of Equipment for the Generation and
Utilization of Heater a Distillation Equipment of
Tank-Car Heater a Distillation Equipment - Oil
and Gas-Fired Conversion Burners



Write for your copy of the latest illustrated Cleaver-Brooks Boiler Catalog. It tells and shows why Cleaver-Brooks Boilers will save you money.





ALABAMA BY-PRODUCTS CORPORATION of Birmingham—one of the Nation's largest commercial coke producers—is now rushing to completion the fifth expansion program in its history. Because of the tremendously increased demand for coke from the Southeast's flourishing foundry trade, the Company is building a new battery of coke ovens which will bring its capacity to over 900,000 tons a year. It is likewise stepping up the output of its coal chemicals and by-product gas.

"Our large expansion program helps assure an ample supply of quality coke for the Southeast's fast growing malleable and grey iron industry," says Phil H. Neal, president of ABC. "Capacity of our plant has been increased more than fivefold since our Company was organized. Biggest factor in our growth has been the broad-scale industrial development throughout the Southeast. Another is Birmingham's superior location as a distribution center—not only for the whole Southeast but for all the 31 States we serve and our export markets in Canada, Cuba and Mexico."

ABC is one of scores of Birmingham district enterprises that have spiraled from small beginnings into nationally known industries. New plants will find even greater growth opportunities because of the accelerating progress of the South. Stake your claim now.

The state of the s

The Committee of 100 or any of the undersigned members of the Executive Committee will welcome the opportunity to give you confidential and specific data regarding the advantages of the Birmingham district for your plant, office or warehouse.

BIRMINGHAM OMMITTEE OF 100

1914 Sixth Ave., N., Birminghem, Ala. Executive Committee

Gordon Persons General State of Alabama Breathard C. Calean Freedont Woodward Iron Co. Jakes S. Colomon Possidant Eurosphan Treat Damold Comor Chineson of the Board Arondole Mills Proclaim P. Begal Proclaim Engal Composito W. W. French. Jr. President Meany Mundley Claranca B. Hansan, Jr. Publisher The Binningham News -W. H. Hasser Presiden Depleyers Inscence

Claude S. Eswan
Provident
Siss-Sheffeld
Free B. Fran Co.
Therman of the Board
Alabana Pavar Co.
J. C. Parsens

O. W. Eshanbarihar President Lorenzo, Joseph & Lorek A. V. Wabbel News, cont. . .

Chemico will have the only major sulphur mine in the West.

The company will put up a \$300, 000 pilot plant at Sulphurdale for the production of elemental sulphur. It will have an ore capacity of 100 tons a day, and should be completed shortly.

If all goes well, a 1,000 ton mill will be built. Conventional milling processes would be used. However, Chemico would also use boulders and coarse rocks making up the conglomerate in the ore milling.

Besides elemental sulphur, the company is considering making low-grade soil-sulphur for agricultural needs.

New Device Can Measure Odors Polluting City Air

Recently the Franklin Institute, sponsored by the Philadelphia City Planning Commission, developed an apparatus that isolates and measures the chemical components of odors. Municipal control of these atmospheric pollutants is now said to be possible for the first time.

The apparatus consists of a specially constructed liquid-nitrogen condenser that cools the odorous gases to -270 deg. F. An infra-red spectrometer analyzes the resulting liquid for its chemical components. And a simple tester identifies certain malodorous compounds in the field.

At present Philadelphia's air pollution ordinance does not mention odors. But pressure will now be applied to remedy legislation. If approved, 23 plants in the area—including fertilizer plants and glue factories—will fall under controls. Smoldering dumps may also be regulated.



BAILING SCRAP RUBBER

To handle the daily load of 200,000 lb. of scrap rubber, Pequanoc Rubber Co., Butter, N. J., has worked on a bailing system that permits a fork truck to lift such packages as these old tires.

Gigantic Market Predicted For Porcelain Enamel

Almost 7 million homes have no bathtub or shower; 6 million housing units have no private toilet facilities; 3 million have no running water; over 8 million have no water-heating facilities.

Along with that 2.5 million homes are in need of major repairs, and 18-22 million new homes will be built in the next 20 years. Result is a colossal market for the process industry, particularly for the porcelain enamel business.

Predicting a bright future, President R. A. Dadisman of the Porcelain Fname! Institute, expects production to jump 125 percent by 1970. He noted that in 1950 the industry turned out 400 million sq. ft.; in 20 years he estimates 900 million sq. ft. Mainly responsible for the optimistic estimates is the recently developed curtain wall, the first fully satisfactory wall.

The porcelain enamel industry, however, will not be the only contestant for this business. Plastics, organic finishes, glass, stainless steel and aluminum industries are fondly eveing the same horizon.

CONVENTION CALENDAR

Chemical Market Research Association, Roosevelt Hotel, New York, February 28.

Drug, Chemical & Allied Trades Section, New York Board of Trade, annual dinner, Waldorf-Astoria Hotel, New York, March 6.

American Institute of Chemical Engineers, process equipment and market research symposia, Biltmore Hotel, Atlanta, March 16-19.

Commercial Chemical Development Association, annual open meeting, Statler Hotel, New York, March 20.

American Chemical Society, national meeting, Buffalo, N. Y., March 23-27.

American Pharmaceutical Manufacturers Association, annual meeting, Boca Raton Club, Boca Raton, Fla., April 7-9.

National Agricultural Chemists Association, spring meeting, Fairmont Hotel, San Francisco, April 7-9.

Association of Consulting Chemists & Chemical Engineers, general symposium, Belmont Plaza Hotel, New York, April 22.

American Oil Chemists Society, spring meeting, Shamrock Hotel, Houston, April 28-30.

American Drug Manufacturers Association, annual meeting, Homestead Hotel. Hot Springs, Va., April 28-May 1.

FOSTER FLOW TUBE*



Take a good look at the picture of the Foster Flow Tube. Note how short it is in relation to the throat diameter—how a 12 inch Flow Tube is hardly more than 18 inches long. This is about maximum ratio for 3" sizes and larger. In high main line velocities (above 10"/sec. for liquids), tubes are less than one diameter in length.

Supposing you have a line carrying liquids or gases coming into your plant and you want to meter the flow accurately. Wouldn't you want to avoid an expensive installation, one that possibly involves a housing or vault for a meter that has to be installed outdoors? That's where the compactness of the Foster Flow Tube will come in handy. You can install it anywhere on the entering line—most of them can be indoors. You install it just as you would a short section of pipe—and as easily. Except to connect valves or regulators, upstream or downstream, you don't even need straight sections.

Coupled with this simplicity of installation is an accuracy comparable in all cases to that of the conventional primary devices; in many cases, a greater accuracy. Foster Flow Tubes are available in all commercial pipe sizes. Write for details and tell us about your processing and installation requirements.

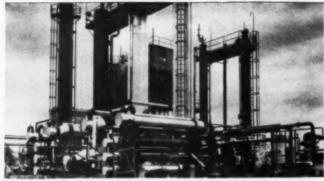
*A Proved Flow Tube Added to Faster Line of Regulating Valves

FOSTER ENGINEERING

835 Lahigh Avenue . Union, N. J.

PRINCIPAL MODIFICATIONS... MINES AND BACK PRESSURE VALVES... CUSHIQUE CHICK VALVES... ALVINDE VALVES... FAM.
BERRING REGISATIONS... FRAME CO-VERNINGS... THEFER THAT MEDICATION ... FRAME AND LIVES BALANCED VALVES...

MODIFICATION OF THE PROPERTY OF THE PROPERTY MEDICATION ... FRAME AND LIVES BALANCED VALVES...



SYNTHESIS GAS is formed in these units, goes to Oxo step (right).

Longview Goes on Stream

From natural gas and propane, Texas Eastman will get ethanol, butyraldehydes and higher alcohols. Thermal cracking and modified Oxo process will be used.

Another new petrochemical plant has just started operating in Texas. It's the big plant of Texas Eastman Co., which spreads over 2,400 acres on the outskirts of Longview. Natural gas and propane have started flowing into the pipelines, furnaces, reactors, condensers and columns of the mammoth plant. This climaxes research begun six years ago in the Kingsport, Tenn., laboratories of the Tennessee Eastman Co. and represents for the company a long step toward self-sufficiency in raw materials. Both companies are divisions of Eastman Kodak Co.

During the warm-up period, between 25,000 and 60,000 gal. a day of propane are being piped in from the London, Tex., gasoline plant of Humble Oil & Refining Co. through a recently completed 19-mi., 4-in. line. Ultimately, the Longview plant will use 80,000 gal. a day of propane.

Humble is also supplying natural gas to the Longview plant from the Trawick field in Nacogdoches County. A new 50-mi., 8-in. gas transmission pipeline carries the gas. At present the plant consumes 4 million cubic feet daily. When full operation is attained it will consume over 10 million cubic feet of gas.

Decisive Factors—For many years Tennessee Eastman's principal raw materials have been cellulose and ethyl alcohol. Ethanol is converted to acetic acid, acetic anhydride, butyric acid and butyric anhydride. These acids and anhydrides, together with cellulose, are used to make cellulose esters and other chemicals. Sale of these esters as such, plus their use in acetate yarns and fibers, Tenite plastics and Eastman Kodak's safety film, make them the company's principal

Many factors, of course, influenced the final decision to organize Texas Eastman and build the Longview plant. Of these, however, two were uppermost. One had to do with ethanol itself—Tennessee Eastman's dependence upon ethanol; the unstable price of ethanol; and the potential shortage of this basic raw material. The second factor had to do with the long range outlook for butvric acid and for cellulose acetate butvrate and Tenite II, which are dependent on butvric acid.

▶ Oxo Process—It was concern over butyric acid that set in motion the first development work at Kingsport. This work resulted in successfully combining a synthesis gas consisting of carbon monoxide and hydrogen with propylene under high pressure to form normal and isobutyraldehyde by using the general principles of the German Oxo process. Thus was the first hurdle passed, since the conversion of the aldehydes to alcohols and acids is accomplished by processes at which Tennessee Eastman has long been experienced.

► Thermal Cracking—Next step was to find a source of propylene. Years of research at Kingsport on gas cracking convinced Eastman chemists and



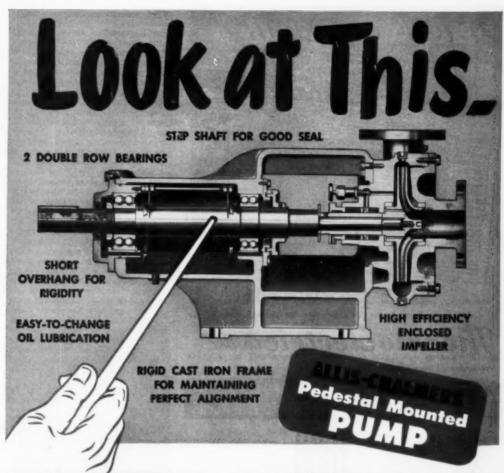
chemical engineers that thermal cracking of propane was the answer. Not only could they get their propylene by this process, but they could also get a big dividend—ethylene. And ethylene was a stepping stone to ethyl alcohol. Starting with propane, then, Tennessee Eastman could get acetic acid and acetic anhydride for its cellulose acetate, butyric acid and butyric anhydride for its mixed esters.

anhydride for its mixed esters.

Single Reaction—Two other raw materials were necessary, carbon monoxide and hydrogen for the modified Oxo process, and hydrogen for the conversion of both of the aldehydes to their respective alcohols. Here again a single reaction could supply both requirements, and equipment to do this had already been developed by others. Carbon dioxide, natural gas and steam react at high temperatures to produce carbon monoxide and hydrogen. This reaction was ideal since abundant natural gas could be found in the same area as propane.

Ethylene to Ethanol—Only one problem remained, the conversion of ethylene to ethyl alcohol. The most widely used process to accomplish this involves the use of sulphuric acid. But the shortage of sulphur made this method impractical. So a route from ethylene to ethanol was developed in Tennessee Eastman's pilot plant that did not require use of sulphuric

Picking Plant Site—Next came the job of selecting a location for the plant. It had to be near an economical



FOR SPECIAL DUTY PUMPING!

Easily Made Factory Modifications Make This Pump Ideal for Your Special Duty Jobs!

LET THIS PUMP meet your problems of: temperature, corrosion or contamination.

A wide combination of optional constructions and materials can be used . . . for example, six alternate sealing arrangements. In addition, materials for wetted parts are available, to resist attack of acid and alkaline liquids.

Moreover, Allis-Chalmers application engineers have ex-

perience in handling many types of liquids. They will help you choose exactly the right combination of materials and modifications to give you low cost per gallon pumped.

Allis-Chalmers can furnish the complete pumping unit—pump, motor, drive and control—all mounted on a rigid base ready to install and run. You save time and installation cost. Guarantee covers the complete installation.

Capacities to 1200 gpm; heads to 250 feet; temperatures to 500 degrees F. Call your A-C district office for Bulletin 52B7638, or write Allis-Chalmers, Milwaukee 1, Wisconsin

ALLIS-CHALMERS



FINGER TIPS

COLOR CODES for Pyrometer Wires

CALIBRATION
FOR THERMOCO

THER

Thermo Electric Co. Inc.



News, cont. . .

supply of natural gas and propane. And a suitable water supply, adequate transportation and a source of labor were essential. Northeast Texas looked like the best bet. Just to the west of Longview is the fabulous East Texas oil field, with the greatest proved oil reserve in the U. S. Near Longview flows the Sabine River, and Longview, with a population of about 25,000, could provide the workers. In addition, Longview is served by three trunk line railroads, by a system of highways and a modern airport.

► Water Supply—The Texas Eastman plant is located about five miles from Longview on the Sabine River in Harrison County. During most of the summer months the Sabine, like most Texas rivers, is a small stream. Because of this, Eastman has created a 300-acre lake on its plant site by erecting a dam across a small creek. The horseshoe-shaped lake measures about one and a half miles around from tip to tip. Into one end of the lake, river water is pumped as needed. Also into this end of the lake, condenser water is discharged from the plant. Water for plant use is taken from the bottom of the other end of the lake. The lake thus provides a settling and cooling basin that will be essential in the summer when the Sabine is low, full of silt and its water at elevated tempera-

▶ Plant Operations—The heart of the plant itself is situated in the center of the area inclosed by the horseshoe lake. The plant clusters around the steam plant and the reactor building. At one end are the units where natural gas, carbon dioxide and steam are brought together and cracked at high temperatures to provide synthesis gas for the Oso process and hydrogen for subsequent hydrogenation reactions. At the other end, propane is cracked and propylene and ethylene separated.

The propylene and synthesis gas from these two operations are fed under high pressure into catalytic reactors where a mixture of n-butyraldehyde and isobutyraldehyde is formed. The aldehyde mixture from the reactors is then separated and refined.

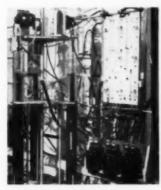
Ethylene from the propane cracking units is sent to the alcohol plant where it is converted into ethyl alcohol. The alcohol units will be the last to get into production, probably won't be ready until April.

▶ Products—The production of n-butyraldehyde will be split three ways, a portion to be sold as the aldehyde, a portion shipped to Kingsport, Tenn., where it will be converted to alcohol and acid for use in manufacturing cellulose acetate butyrate and Tenite plastic, and a portion converted to 2ethyl hexyl alcohol for use in manufacturing dioctyl phthalate at Kings-

The isobutyraldehyde output will also be split three ways, one part will be available to industry as the aldehyde, another part will be converted to the alcohol, and a part will be converted to the acctate. One promising outlet may be in lacquer formulations where the isobutyl alcohol and acetate could be substituted for the currently used n-butyl solvents.

Ethyl alcohol produced in Texas will be shipped to Kingsport for conversion into acetic acid, acetic anhydride and such solvents as ethyl acetate and isopropyl acetate.

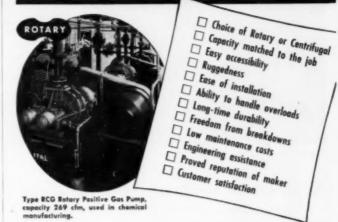
▶ Process Instrumentation — While Texas Eastman is a division of Eastman Kodak, all of its products will either be used or sold by Tennessee Eastman. Initially, some 400 people will be required to operate and maintain the Texas plant. This relatively low number is possible due to extensive instrumentation and continuous processes. Over 50 mi. of tubing connect all the automatic controls.



Continuous Ion Exchanger

With a large industrial potential in mind, the chemical engineering section of Stanford Research Institute, Stanford, Calif., has been working for more than two years on the development of continuous methods of ion removal and ion separation. The experimental glass apparatus designed by SRI chemical engineers provides counter-current contact of moving resins and solution. Starting clockwise from the left, the apparatus consists of exchange columns, a flow metering control panel and thyratron tubes. In this model, resins are passed mechanically from one column to another in a continuous operation consisting of three phases: removal, regencration and rinsing.

No more "off the cuff" decisions when you compare blower values



If you are considering new equipment for handling gas or air, we suggest you examine the essential values listed above, before you make your final selection. These factors will help you determine the unit that will best match your specific application, and that will give you the most satisfactory, economical performance.

You'll find that R-C equipment rates high in every one of these essential factors. With capacities ranging from 10 cfm to 100,000 cfm or higher, at moderate pressures, and with the exclusive dual-ability line of Centrifugal or Rotary Positive types, you have a wide choice to meet the most execution needs.

If you'd like to tell us about your specific problem, we'll gladly send detailed information for comparison, or supply engineering help from our 98 years of blower building experience.

ROOTS-CONNERSVILLE BLOWER CORPORATION 522 Illinois Avenue, Connersville, Indiana







BARGE, specially designed, holds 3,200 tons, so every 18 hr. . . .

Acid Goes to Sea; No Pollution

National Lead proved that ferrous sulphate and sulphuric acid in the ocean did not harm aquatic life. With similar problems, you can profit from this research.

Dumping corrosive wastes at sea is a new wrinkle in pollution control. But after painstaking study, National Lead Co. is discarding acid waste from its Sayreville, N. J., titanium dioxide plant about 14 miles off the New Jersey Coast. The waste runs about 10 percent ferrous sulphate and 8.5 percent sulphuric acid.

When the company began to barge its wastes to sea in 1948, fishing interests in the area objected with vigor. So National Lead asked National Research Council to study the problem.

The Council enlisted the aid of the U. S. Fish and Wildlife Service and the Woods Hole Oceanographic Institution. Results were made known a few weeks ago: there is no danger of ocean pollution from National Lead Co.'s activities. Naturally, this conclusion doesn't necessarily extend to other types of waste.

Broad findings of the study may be of interest, though, to the 880 industrial locations in the North Atlantic drainage basins in need of adequate pollution control.

How Waste Is Removed—The specially constructed barge (see cut) carries 3,200 tons of the waste and discharges one load every 18 hr. when operating on a full schedule. About 18 tons per min. are discharged from two 12-in. pipes mounted on skegs at keel level at the after end.

When the barge is fully loaded,

these pipes are at a depth of 15 ft. But as the waste is discharged, the depth decreases to 6 ft. when the tanks are empty. The barge, moving at a speed of about 6 knots, can discharge at the rate of about 60 lb. per ft. of distance traveled.

The discharge pipes are so located that the waste enters the sea in the very turbulent region where water displaced by the barge's passage is rushing in under the stern to form the wake. So it's rapidly mixed and greatly diluted.

▶ What Happens—The expected effects of ferrous sulphate and sulphuric acid on fresh sea water are (1) an increase in the ferrous ion concentration; (2) increase in the sulphate ion concentration, and (3) disturbance in the acid-base balance of sea water because of the acidity.

Yet it was found that the acidification of the sea water was short-lived. This was because of the rapid dilution and neutralization (with excess base normally present in sea water) upon discharge into the turbulent

The only prominent after-effect of the disposal operation was the turbidity of the water due to the formation of ferric hydroxide in the wake.

▶ No Accumulation—Close to 4,000 tons of waste has been barged to sea each day since April 1948. So a study of the cumulative effects of the waste

was in order, and extensive surveys were made at regular intervals.

The researchers thought that the iron content of the water was most likely to show cumulative effects since it was present in the waste in large amounts, and since minute amounts of it can easily be detected in sea water.

But tests, using the dipyridyl method, showed that the quantity of iron in the waste was such that if it were all deposited on the bottom as metal in the 4 sq. mi. assigned for disposal, it would build up a layer less than 0.5 mm. thick in one year.

► No Biological Damage—Biological tests have failed to produce any direct evidence that the populations of fish or of bottom living animals are being damaged or excluded from the area by the disposal of wastes.

Zooplankton thrown directly into the contaminated water of the wake are immobilized, but recover when the contaminated water is diluted with clean sea water—as would happen quickly where organisms were caught in the wake. With the rapid dilution and neutralization of the waste in the wake, and the very small part of the sea water in the area which is temporarily acidified, it's not likely that the microscopic plants or animals forming the basic food supply of fishes are being harmed.

New Electronics Industry May Challenge Chemicals

A new electronic device, composed of a single crystal of the element germanium, performs most of the functions of a vacuum tube—and some a vacuum tube does not.

Smaller than a green pea, it operates at powers one ten-thousandth of that required to heat the filament of the smallest vacuum tube. It could spur a new electronics industry big enough to challenge the chemical industry.

"This new electronics industry," according to Robert M. Burns, chemical director of the Bell Telephone Laboratories, "will become the only rival in size of the chemical industry, that growing industrial group that seems destined to take over all other manufacturing industry."

However, large industrial movements as these will require vast numbers of scientists an engineers, and radical changes in our educational methods.

Speaking at the Waldorf-Astoria last month before the American Section of the Society of Chemical Industry, who awarded him the 46th Perkin Medal, highest award for

DON'T BE FOOLED BY IMITATIONS

Always Specify

DREW

COCONUT FATTY ACIDS

Many have tried and more will try to imitate the composition, color, stability and freedom from odor of Drew Coconut Fatty Acids.

Invariably, lack of specialized knowledge and experience make these imitations fall short of the real thing. Drew's many years of close study of fatty acids, plus modern research and production techniques, give you a product plus in Drew Coconut Fatty Acids that is unmatched by imitations.



DREW COCONUT FATTY ACIDS SET THE STANDARD

 Distilled and fractionated to improve composition and odor; to give longer lasting color and stability; and to provide greater soap



Produced by one of the largest and most experienced manufacturers of fatty acids.

 Specified by name wherever government specifications call for highest quality fatty acids.



If quality has made your product famous...if you want to establish quality in your product...don't be satisfied with imitations. Always specify Drew Coconut Fatty Acids.

Write for Free Reference Booklet, "Drew Fatty Acids"

DISTILLED AND FRACTIONATED FATTY ACIDS

COCONUT LAURIC STEARIC LINSEED COTTONSEED CAPRIC

OLEIC

CAPRYLIC

MIXED VEGETABLE

TECHNICAL PRODUCTS DIVISION

E. F. DREW & CO., INC.

15 EAST 26th STREET, NEW YORK 10, N. Y.

CHICAGO

PHILADELPHIA

BOSTON

-





Submerged Combustion DIRECT FIRED GAS BURNERS

A NEW METHOD FOR **HEATING** and EVAPORATING

CORROSIVE AND NON-CORROSIVE LIQUIDS

- * Flame burns below surface, bringing liquid quickly to heat.
- * Hot exhaust games forced through liquid carry away moisture.
- Provides rapid evaporation and concentration of acids, salt solutions, suspensions. Also adapted to heating water and solutions.
- ★ Installed in any type tank. No boiler room required. Use any type gas—natural or mane-factured. Automatic in operation.

sed view Submerged Com-Burner as now used to trate calcium chloride and ferric chloride.

> Send for descriptive circular No. 52 and details MERGED

COMBUSTION CO.

HAMMOND IND. 759 LOGAN STREET

News, cont. . .

achievement in American industrial chemistry, Burns had this to say on the subject:

"I believe the doctorate should be reserved for those having demonstrated talent for research. A far larger group of young men would be benefited by advanced training in industrial chemistry, basic engineering subjects, economics, psychology, business methods and the general technology of manufacturing and operating industries. Careers await men so prepared.

"Statistics indicate that only a fraction of those qualified for higher education become college graduates. . . Interest in science may be effectively encouraged at the secondary school level or even in the elementary schools."

Result of contemplated growth in electronics and chemicals should be pervasive. "We may look ahead to the time when the electron will do man's work, including thinking, while chemistry supplies him with food, clothing and everything else."

Some feel this could put man out of business



Europe's First Cat Cracker

To be used in the fluid bed process, catalytic cracking unit has been built at the Rotterdam-Pernis refinery of Royal Dutch Shell. Regenerator with elevator is in the foreground; at right, the fractionating column.

Pick Century's Outstanding **Engineering Development**

"What, in your opinion, has been the most significant development in vour field of engineering in the past century."

The question was asked by John R. Dunning, dean of engineering at Columbia University, in a recent poll of editors of 32 leading trade journals and business publications.

The answer according to the majority of opinion: Developments in the production and use of steel. Specifically, such achievements as the Bessemer converter, the regenerative principle of steel-making, the construction of high-speed continuous mills for rolling steel strip and sheet, the skeleton frame-curtain wall concept of building, the development of a host of allows, and the improvements in

the quality of steel.

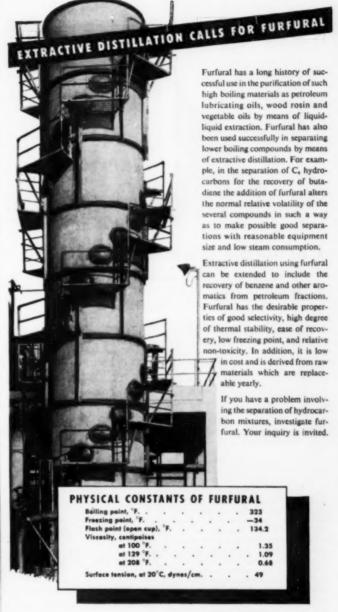
Among the honorable mentions were assembly line production, reinforced and pre-stressed concrete, the telephone, heavier-than-air craft, the vacuum tube, interchangeable parts, the gage block, the flotation process, automatic central heating with oil and gas, air conditioning, the concrete highway, mechanized construction equipment, waste disposal, antibiotics, the internal combustion engine, the diesel engine, the gas turbine engine, the high-speed electronic digital computer, the high-pressure still, the continuous-flow chemical plant, pulverized coal firing, electrolytic separation of aluminum, the tin can for food packing, the construction of the turbojet, turboprop, and rocket power plants in aircraft, and the cracking process in petroleum.

Technologists on Fortune selected their choices by field. In chemical engineering: the high pressure still and the continuous-flow plant.



Stauffer's Inferno

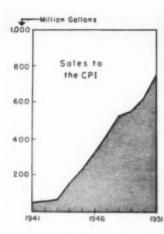
Workmen put the final touches on the Herreschoff furnace of Stauffer Chemical Co. The new roaster, believed to be the largest of its kind in the U. S., will produce SO₂ from pyrites for the company's Richmond, Calif., sulphuric acid plant. When on stream, it will turn out one-third of the SO₂ consumed at the plant.





Room 535E, 120 Wall St., New York S, N. Y.

In San Francissa, The Griffin Chemical Company • In the United Kingdom, Imperial Chemical Industries Ud., Billinghom, England • In Australia, Swift & Company, Pty., 11d., Sydnay • In Europe, Qualer Cest-Granaproduction N. V., Rotterdam, The Notherlands, Qualer Out. France S.A. 42, Rue Pasquier, Paris 8°, France • In Japan, F. Kanematsu & Company 18d., Takyo





Chemicals Hike LPG Demands

Continuing rise of the liquefied petroleum gas industry is echoed by use in the chemical process industries. Last year the petrochemical take broke all records.

With an all-time high of 750 million gallons consumed last year, the petrochemical industry easily kept its place as second® largest market for 1 P. one.

A 22.5 percent increase over 1950, this figure does not even include gas used in the manufacture of components of synthetic rubber and aviation gasoline. The synthetic rubber industry alone required 344 million galions. This compares with 228 million in 1950.

What the petrochemical figures do include are alcohols, organic acids, acetates, anti-oxidants, detergents, plastics, resins, glycols and special solvents. Commercial grades of these chemicals are made from ethylene and propulcine formed by cracking or dehydrogenation of the LP-gas hydrocarbons.

Even Bigger Future—And chemical industry demand is sure to increase even further. In the Gulf Coast area, for instance, plant projects announced, started or completed during 1951 involve an expense of over \$250 million. LP-gas along with oil and natural gas will be the basic raw material for these plants.

LP-gas is one of the fastest growing segments of the petroleum industry. The increase of 846 million gallons, 1951 over 1950, is almost equal to the total sales of 1944. In percentages the gain was 25.9, representing total sales of 4.1 billion gallons in 1951 compared with 3.3 billion in 1950.

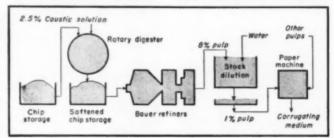
Transportation methods used to move the large volumes of other perfolcum products have been adopted for LP-gas. Several pipelines are already in operation. Another is under construction for moving propane from the Texas Panhandle to Chicago.

Tank cars transport about 50 percent of the gas. An estimated 12,643 were in LP-gas service at the end of last year. In addition, many cars have been built for dual service-anhydrous ammonia and liquefied petroleum gas. ► Supplies Tight—There are indications, however, that seasonal shortages of LP-gas will continue. Plants which recover a high percent of the available propane require much larger investment in facilities and equipment and have higher operating costs than the usual type of plant. Such plants are not attractive to investors and operators unless favorable year-round prices are received for the gas.

Many refineries are converting more and more of their C_a and C_a hydrocarbons to motor and aviation gasoline by polymerization and alkylation processes. That way they yield the refiner better returns than if sold for LP-gas. Storage Goes Underground—But by the end of 1952, underground storage caverns will have added considerably to the industry's primary storage capacity. The caverns are the best antidote thus far for the relatively high cost of conventional pressure-type steel storage tanks.

With capacities up to 100,000 bbl. (4.2 million gallons), they may be washed in salt beds or domes or may be mined in suitable limestone or shale formations.

* Household and farm use is on top with a sales total of 2.9 billion gallons.



Caustic Pulping Shows Promise

A new pulping process, which digests chips in a cold caustic soak, gives higher yields with less steam. Still in the trial stage, it may edge out the semi-chemical process.

After one year and almost 15,000 tons of pulp, Green Bay Paper & Pulp Co., Green Bay, Wis., now believes it has a cold caustic pulping process that pretty well lives up to expectations.

Although still under development,

it is one of the most promising new ways to stretch forest supplies. The new process has already attracted widespread interest among chemical engineers at work in the pulp and paper industry.

Basic research was worked out by

An average-size refinery can save \$50,000 in first cost by using Alcoa Aluminum Heat Exchanger Tubes!

(Figured on 20,000 Tubes)

This is based on current tube prices . . . % less than seamless mild steel, 1/2 as much as Admiralty, 1/6 the cost of stainless. Compare these savings in aluminum against the metal you now use.

knows most about their use and application

Alcoa pioneered the use of aluminum in heat exchanger tubes 43 years ago. Although their sale today is limited by government regulation, you will want to start planning with a copy of the booklet, "Alcoa Aluminum Heat Exchanger Tubes". Write:





OVER 6-MILLION FEET OF ALCOA TUBES ARE IN USE FOR APPLICATIONS LIKE THESE . . .

PETROLEUM

Condensers handling hydrocarbon fractions from such processes as Thermal and Catalytic cracking, reforming, polymerizing, etc.

Vapar recovery condensers Lube oil coolers

Natural gas compressor aftercoolers Recompressor aftercoolers

Hydrogen sulfide gas coolers Furfural condensers and heat exchangers

Propane chilling

Wax sweaters

Lean oil-rich oil exchangers

Amine solution coolers

Glycol-amine solution coolers,

heat exchangers and reboilers

CHEMICAL

Butanoi Ethanol Ethylene Glycal Glyceria

Hydroabietyl

Isoproponol Methanol

Phenol

Propylene Glycol Acetaldehyde

Formaldehyde

Furfural Heptaldehyde

Acatic acid

Stearic, Palmitic, Maleic Oleic acids

Butyric acid Naphtha

Richaleic acid

Acetanilide

Ammonia

Hydrogen Cyanide

Nitric acid (concentrated) Pyridine

Hydrogen Sulfide

Dichlorobenzene

Gasoline

Gelatia Hydrogen Peraxide

Turpentine

Use Alcoa Alclad 35-H14 Heat Exchanger Tubes with fresh, brackish and salt-cooling waters

U. S. Forest Products Laboratory at Madison. The idea was to find a way to soften chips enough for suitable mechanical fiber separation without losing too much wood in the process.

A cold caustic soak proved to be the answer, giving added bonuses of better yields, lower chemical consumption and steam requirements 75 percent lower than the semi-chemical

pulping process.

Yields are also higher in the new process. In the semi-chemical process, which was patented in 1933 and is now used in 19 mills in the U. S., wood is softened by a mild cooking operation. It is then mechanically dis-integrated. Yields are about 75-85 percent. However, vields in the cold caustic process are frequently as high as 90 percent.

Green Bay made a few trial runs in 1950. Blended with standard neutral semi-chemical pulp, cold caustic pulp produced a good quality corrugating medium. Green Bay started continuous production in February 1951; since then it has used the pulp as a 25-60 percent component of its 80-90 ton-per-day production of cor-

rugating medium.

Improvements now under consideration will improve strength characteristics and bring wider applications for the pulp. Since it uses regular semi-chemical pulping equipment, the process may soon be adopted by

▶ Needs Little Steam—The soak is at room temperature. Ten tons (ovendry basis) of chips are soaked in 12,000 gal. of 2.5 percent caustic liquor in a 16 ft. rotary digester.

After 2-3 hr. soaking, the weak liquor is drained off and returned to the solution tank. There it is fortified for reuse with 200 gal. of 50 percent caustic. Excess caustic is stripped from the softened chips with steam. This is the only steam requirement of the process.

Chips are then dumped to a softened chip storage pit and fed to a double-disk Bauer refiner. One pass produces an acceptable pulp running about 8 percent. Stock dilution lowers consistency to about 1 percent for the paper machine.

Following dilution, the pulp is screened and sent to the paper machine. It issues as 0.009 corrugating medium. Entire cycle requires only

4 hr.

Improved methods of removing caustic and removing bark from the wood are being developed. Many engineers believe that these will bring the process into wider use in the near future



PIPELINE SYSTEM transports ore concentrate to mill and tailings to waste.



TAILING LINE in foreground conveys waste; smelter stacks rise on skyline.

Ore Concentrate Pumped Miles

Believed biggest ever of its kind, new pipeline carries 800 gallons a minute of nickel-copper concentrate to Copper Cliff reduction plant in Ontario.

A 7½ mi. pipeline has been completed by the International Nickel Co. of Canada, Ltd., through which the bulk concentrate from 3,650,000 tons of nickel-copper ore is being pumped annually from its newly built Creighton concentrator to its reduction plants at Copper Cliff, Ontario. It is believed that never before has concentrate been carried by pipeline in such quantity over such a distance.

According to Vice President R. L. Beattie, "The pipeline reduces the time required to transform nickel ore into refined nickel. Further, the economies resulting from pipeline trans-portation, together with other economies, have made possible the working of lower-grade Creighton ore which is now contributing to the availability of nickel for the defense production needs of the free world.

Part of International Nickel's \$130 million program of underground mine expansion, the pipeline artery has been integrated into an elaborate pipeline system that also carries tailing, or waste material, from both Creighton and Copper Cliff to a disposals area midway between the two

The system has 12 mi. of trestle, at some points 65 ft. high to assure a slope to and from each of the five relay pumping stations so that the concentrate lines will be self-draining in case of power difficulties. All told, 3 million board feet of lumber and

40 mi. of wooden pipe were used. When milling 10,000 tons of nickel-copper ore a day at Creighton, approximately 1,800 tons of concentrate and 8,200 tons of tailing are produced. Water added to the concentrate makes a pulp that flows through the pipeline at the rate of 800 gal. per min. The tailing pulp flows at the rate of 2,500 gpm.

Despite the northern weather, the complete pumping system has been designed for trouble-free

operation.



Instantaneous water quenching of spot-welds, bonding stainless liners to carbon steel plate, is just as effective as though it were done submerged in a fish bowl!

Resistance welding under water

preserves corrosion properties of stainless liner in SMITHlined vessels

An exclusive A. O. Smith technique makes sure that stainless lining spot welded to carbon steel plate, retains its original corrosion-resistant properties in process equipment.

Closely and precisely spaced spot-welds that inseparably bond the liner to the load-bearing vessel walls are instantly quenched in water at the time of welding. The interval of critical temperature is so short that preferential attack is avoided.

The automatic equipment employed in this operation is A. O. Smith designed and built. Simulta-

neously, it joins liner to base under great hydraulic pressure, applies the welding current and floods the spot with quenching water.

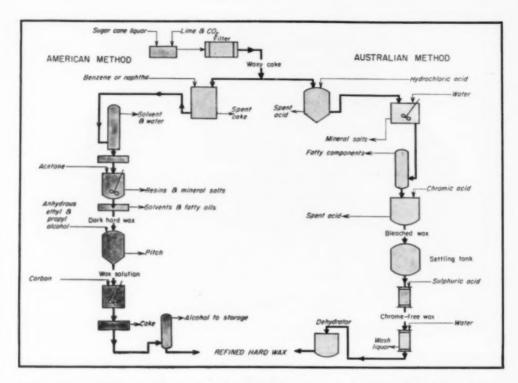
No wonder SMITHlined pressure vessels have records of more than twenty years in corrosive service without failure.

For assurance of superiority in vessel design and construction, and for aid in solving vessel application problems, call on A. O. Smith where the industry's leading laboratory, design and engineering groups are at your service.



A.O.Smith VESSELS - HEAT EXCHANGERS

Boston 16 · Chicago 4 · Clevoland 15 · Dellas 2 Denver 2 · Hausten 2 · Los Angeles 22 · Middland 5, Taxas · New Orleans · New York 17 · Philadelphia 3 Pittsburgh 19 · San Francisca 4 · Seattle 1 · Tuise 3 Washington 6, D.C. International Divisions 9.O. Box 2023, Milwaukee 1



Getting Wax From Sugar Cane

Refining by solvent extraction pays off handsomely for sole U. S. producer. Now Australians claim vacuum distillation and chromic acid bleaching work even better.

Despite the fact that the United States is the world's biggest consumer of vegetable waxes, it has to depend on foreign sources for most of its supply of such important hard waxes as carnauba, candelilla and ouricury. Yet each year sugar cane mills in the United States, Hawaii, Puerto Rico and Cuba throw away about 60 million pounds of crude sugar cane wax. From this crude wax about 38 million pounds of a usable dark hard wax could be produced annually, more than the world's combined output of carnauba, ouricury and candelilla.

This situation was too tempting for sugar refiners and wax makers to pass up. Cuban-American Sugar Co. and S. C. Johnson & Son, Inc., joined forces, tried out their process in a pilot plant at Chaparra, Cuba, near Cuban-American's big cane mills, then built a commercial plant at Gramercy, La. The only sugar cane

wax plant in the United States, it's operated by Colonial Sugars Co., a Cuban-American subsidiary.

The Gramercy plant has been producing about 2 million pounds a year of sugar cane wax and plans to expand. NPA has been urged to help in getting steel for sugar cane wax plant expansion. Increased production in this country would lessen U. S. dependence on carnauba wax imports that could be cut off by war.

In the present American process, solvent extraction is used both to get the crude wax out of the press cake and to refine the wax. Recently, a group of Australian researchers headed by H. H. Hatt has come up with a refining process that uses vacuum distillation and a chromic acid bleach instead of solvent extraction. The U. S. producers are keeping close tabs on this development, but seem to figure that any advantages of the

Australian refining process might be offset by higher costs.

From Stems to Cake—Wax occurs as a thin white layer on the outside of the sugar cane stems. When the cane is milled, about 40 percent of the wax is loosened and remains suspended in the juice. When the juice is clarified by liming and carbonation with CO, the wax is carried down in the calcium carbonate precipitate. After filtration, the wax is concentrated in the press cake.

Crude wax content of the press cake varies from a fraction of 1 percent up to 22 percent on a dry weight basis. The total solvent extractable mixture of wax, fatty and resinous material in the press cake has been reported as 21 percent of the dry press cake for operations at Cuban-American's refineries at Centrales Chaparra and Delicias, Cuba.

▶ Getting Out the Wax—Crude wax is leached from the filter cake in a continuous vertical extractor at the Cuban sugar mills and shipped to Louisiana for refining. At Gramercy, the crude wax is extracted with acetone at 90-100 deg. C. About 18 percent of the crude wax—consisting of calcium and magnesium salts of the wax and resin acids—remains undis-

Chemical Industry millions each year

VITAL EQUIPMENT IS DESTROYED ... PRODUCTS CONTAMINATED

Corroscia buta a valy valid-oque

Correlies may cross extensits the of your products, combing to a accounty less of production as profits.

It course but of output and mis of merchours when your plant is the down for repairs due to correction.

Every bracknessman become this but do you know that the total cost to American industry is \$5,000,000,000 are cally ... and do you know how much corrested here and costs in your even operation?

Assertion field engineers of tree-lable without obligation to check your plant for controls problems on the to train specific programmed by term.

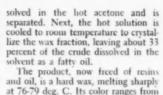
Why not start your chackup non Wall by glad to help you.

FOLLOW THE LINE OF most RESISTANCE
....PROTECT WITH Americant

AMERCOAT CORPORATION

A division of American Pipe and Construction Co. 4809 Firestone Blvd., South Gate, California





The product, now freed of resins and oil, is a hard wax, melting sharply at 76-79 deg. C. Its color ranges from dark green to tan and brown. The process gives a yield of about 50 percent.

The purified cane wax contains about 66 percent esters, 27 percent free acids, 5 percent free alcohols and 2 percent hydrocarbons. Chemically, the wax is more complex than other commercial hard waxes. Characteristics of the final product can be varied.

they depend on the initial recovery

process and on refining treatment.

Australian Process—Crude wax is recovered from the press cake by solvent extraction, and until the advent of the Australian process the crude wax had always been refined by solvent extraction. Now, however, Hatt and the other Australians propose a new three-step refining process. It consists of (1) demineralizing with hydrochloric acid, (2) distilling under vacuum to get rid of the components of lower molecular weight, and (3) bleaching with chromic acid.

Since it's unlikely that more than 2,000 long tons of crude wax will ever be available in any one year in Australia, the Australians have based their estimates on a plant to process 1,000

long tons annually.

Demineralization takes 24 hr. Based on a working year of 250 days, and supposing a wax with a specific gravity of 0.84 at 100 deg. C., the Australians would have to treat 1.070 gal. of wax per day. Minerals present in the crude wax consist of 60 percent CaCO, and 40 percent Ca(PO₄). At an average mineral content of 5 percent, it would take 900 gal. of 3.3 percent hydrochloric acid to treat 1.070 gal. of wax. After treatment with hydrochloric the wax is washed three times with water to remove the acid; this takes 18 hr. Yield of demineralized wax is 90

Following the acid treatment, the wax is distilled under I mm. pressure at 300 deg. C. to remove the soft or fatty components. Special stainless steel (Type 316) would be required to resist fatty acids coming over at that temperature. The distillation unit would require Dowtherm heating, and the receiver would have to be heated because the last part of the distillate has a melting point of 60 deg. C. It is, however, proposed to collect only one distillate. Steam would be bled into the molten wax at the rate of 0.5



Tantalum's speed in heat transfer, freedom from thermal shock, and acid-proof properties add up to equipment that increases production, saves time and space, saves maintenance, saves shutdown time, and eliminates product contamination due to corroded equipment.

Use TANTALUM With Economy for most acid solutions, corrosive gases or vapors; not with HF, alkalia, substances containing free SO3.

Tentelum Steam Coil. Additional heating capacity obtained by building coil on large steel flange protected by tantalum tube sheet, eliminating risers. Connections are at bottom.

Write for the Fansteel booklet, "Tantalum Acid-Proof Chemical Equipment", and consult Fansteel for designs and recommendations.

TANTALUM the most representation of construction

Acid-Proof

TANTALUM

Fansteel Metallurgical Corporation NORTH CHICAGO, 1111NO15, U.S.A.

percent of the wax weight per hour to act as an entraining agent during distillation. To develop the vacuum required, the Australians suggest a four-stage steam ejector unit. Depending on the crude, 30 to 35 percent of the lower molecular weight components would be removed by distillation.

In the last stage, the remaining wax is bleached at 110 deg. C. with a mixture of chromic and sulphuric acids. A complete bleaching would take about 12 hr. About 2.5 long tons of material would be processed daily.

A bleaching unit, including the electrolytic regeneration of the chromic acid, has been designed by I. G. Farbenindustrie. The bleaching of 2.5 tons of wax would take 5 long tons of chromic acid daily. Therefore, two banks, cach consisting of 60 electrolytic cells, would be needed to supply the chromic acid, with probably another pair in reserve. Power consumption in the regenerating unit at 4.86 kwh. per kg. of CrO₄ would be 24,300 kwh. per day or about 1,000 kw. The entire plant would operate three shifts per day, five days a week, 48 weeks per year.

After bleaching the wax is washed with boiling sulphuric acid (30 percent weight for volume) and with water. Next it is dried under low vacuum at 200 mm. and flaked if desired. The Australians estimate an over-all yield of 50 percent; for a plant processing 1,000 long tons a year that comes to 1,120,000 lb. annually.

No commercial plant has yet been built by the Australians despite the fact that the refining process has been thoroughly tested. But Hatt says that the process permits the finished product to be modified in many ways, and he and his associates of the Division of Industrial Chemistry in the Commonwealth Scientific and Industrial Research Organization in Melbourne look forward confidently to the production of a whole new series of waxes by the process.

Comparative Costs—The Australians developed their refining process because organic solvents are scarce in Australia. They say the process is "conomical," but some U. S. wax experts are dubious about the cost involved in substituting a vacuum distillation and a chromic acid bleach for solvent extraction. It's debatable whether wax produced by the new refining method could compete in price with the wax made by Johnson and Cuban-American.

Aside from cost considerations, the Australians claim other advantages for their process over present refining by solvent extraction:

 It's flexible enough so that the product can be modified to produce a new series of waxes. (Continued)

HOT FUMES



it's all the same to HAVEG!

The Haveg housings of these 10 DeBothezat Bifurcator fans withstand hot corrosive fumes from cleaning and pickling and are unaffected by weather.

That is because Haveg—a structural plastic—is not affected by chemical corrosion nor atmospheric erosion. Scratches, gouges and abrasions do not affect the service of Haveg equipment because it is corrosion resistant through and through.

In your plans for handling or processing corrosive acids, alkalies or solvents, be sure to check the advantages Haveg offers.

Write for Bulletin F-6.



(see opposite page)



BUT DO YOU KNOW WHAT WE CAN DO FOR YOU IN

for instance, do you know that Dorr...



CAN PLACE AT YOUR DISPOSAL any portion of a complete service for handling ion-exchange problems . . . from problem analysis to initial plant opera-

CAN SUPPLY EQUIPMENT for the treatment of water, and chemical or sugar bearing solutions of all kinds-for extraction and concentration of some of the valuable metals from dilute solutions - in any capacity you require?





WILL WORK WITH YOU on any phase of your ion-exchange program - whether it involves established principles or a new and confidential

If you are currently exploring the possibilities of ion-exchange for new processes or those already established we believe you will find our service helpful. And our ion-exchange facilities are backed by solid chemical engineering knowledge.

> Bulletin #4081 hits the high-spots of Dorrco D.1° Systems. Write to Ion-Exchange Sales, The Dorr Co., Barry Place, Stamford, Conn. *D-I is a trademark of The Door Company.



News, cont. . .

· It can use crude from different mills and still turn out a uniform wax product. Inability to do that has, in the past, been a big stumbling block in commercial exploitation or sugar cane wax.

· It produces a more attractive wax than the present one.

 It makes possible recovery of byproducts that could be used for lubricants, greases and possibly for pharmaceuticals.

What's more, the Australians re-port that a U. S. firm is sizing up the new refining process and may build a plant in the United States. If anyone is interested, it would be S. C. Johnson. So the Australians may really have something, for it's doubtful that Johnson would even think of writing off its big investment in equipment at the Gramercy plant for a more costly process.

Meanwhile, Cuban-American and Johnson are sitting pretty as operators of the sole U. S. plant producing sugar cane wax. Their output is mar-keted by Warwick Wax Co., a subsidiary of Sun Chemical Corp., on an exclusive basis. The wax sells for only 85¢ a lb., making it competitive with carnauba, which costs from \$1 to \$1.25. The sugar cane wax can be used for water emulsion polishes, carbon paper and paste polishes, as a pigment disperser, and for casting purposes. The resin and oil fractions obtained as byproducts from the solvent extraction also have interesting possibilities. Crystalline alcohols, fatty acids, glycerine and other materials can be found in the fatty fraction of the crude wax. Important sterols among the crystalline alcohols are the sitosterols and stigmasterol.



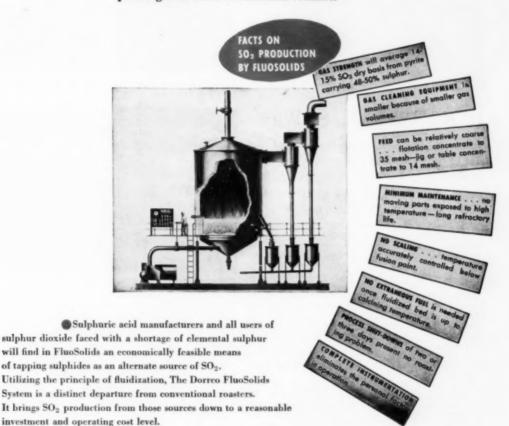
Vestpocket Chemical Plant

A worker notes the pH of solution passing from storage tank on left to crystallizer behind panel at the J. T. Baker Chemical Co. at Phillipsburg, N. J. The new \$3 million unit process plant turns out high purity inorganic chemicals. Here, product purification, crystallization, drying and packaging are done under one roof.

Can you use

14-15% 902 GAS from PYRITE

Dorrco FluoSolids* will produce it . . . at lower investment and operating costs than conventional roasters.



Its economy, simplicity and ease of operation are indicated by the facts above. For more detailed information write to The Dorr Company, Stamford, Conn., or in Canada, The Dorr Company, 80 Richmond Street West, Toronto 1.

*FinoSolids is a tradsmark of The Door Company, Rog. U. S. Pat. Off.





THE DORR COMPANY . ENGINEERS . STAMFORD, CONN. Offices, Associated Companies or Representatives in the principal cities of the world



Over-all view of England's most modern carbon black plant.



From reactor furnace, black goes on to precipitation plant, above.

U. K. Black, U. S. Way

New earbon black plant, largest outside of the U. S., uses as American process to produce half of total U. K. consumption.

Philblack Ltd.'s new carbon black plant is years ahead, engineeringwise, of any other in Britain. The company, a licensee of Phillips Petroleum Co., recently completed the \$6.3 million project in Bristol.

As in America, the blacks are made from a petroleum fraction in a specially designed furnace plant. The only other material required is compressed air, in steady supply and large volume. The process eliminates a great deal of the waste connected with the old method of making channel black from natural gas. Its efficiency is 30 percent compared with 3 percent for the old method.

▶ Two Products—The plant's two units have a capacity of 30 million pounds a year of Philblack 0 and 20 million pounds of Philblack A. The former is for use wherever naximum resistance to wear is wanted, ic., tire treads. Its reinforcing properties greatly exceed those of channel black. Philblack A is a medium reinforcing black used in a wide range of miscellaneous molded and extruded rubber products.

Right now Philblack, Ltd., is getting its oil from America. Soon they hope to switch to British sources. The new Esso refinery at Fawley, Southhampton, has started producing a suitable petroleum fraction. Philblack's 70,000-ton-a-year consumption would take about 1 percent of Fawley's yearly production.

► Temperature Control Vital—During the process, temperature within the reactor is controlled by the air-oil rates, flow turbulency and extent of combustion permitted. All of these, together with reactor design, greatly influence the quality and quantity of the black. The reactor is a steel cylindrical shell lined with high refractory bricks to withstand the extreme heat expression.

withstand the extreme heat generated by the reaction. Vaporized process oil and a controlled supply of air are continuously fed into these reactor furnaces. Combustion products—carbon black, gaseous byproducts and water vapor—are cooled by water spray at the end of the reactor, then by an atmospheric cooling pipe. Products of all reactors come together in a main smoke header pipe, then pass up a cylindrical cooling tower in which open water sprays are fitted.

Finally, the carbon-laden gases are cool enough to



Fluffy product is then densified in these pelletizing mills.

enter the precipitator. They flow through an electrostatic field of 75,000 v. Fine particles of black agglomerate; approximately 30 percent of the carbon black yield falls to the base of the precipitator.

Mild cyclonic or centrifugal action of primary and secondary cyclones extracts an additional 65 percent. Closely woven fiber glass bags remove the remainder and the filtered gases are exhausted to the atmosphere.

The black, now in an extremely fluffy state, flows into pellet mills—long steel cylindrical revolving drums. Air and gas are liberated. The small pellets produced have a density of 23 lb. per cu. ft., a relatively dustless state which affords easy handling.

The plant's products are identical to American Philblacks. The whole project, as a matter of fact, was developed directly from the results of Phillips Petroleum Co.'s research work in this field. All of the required capital, however, was raised in the U.K.

Primarily designed for the rubber industry, the blacks are now also being used in the manufacture of paint, ink, paper and textiles. The total output will amount to about half of U.K. consumption of carbon black. Of this, 90 percent is destined for the rubber industry, the remaining 10 percent for various other industries.

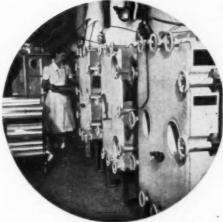
Construction of the plant started in 1949. A 14-in. pipeline nearly 4 mi. long had to be built to carry process oil to Bristol from the delivery point at Avonmouth Docks. In addition to the main storage tanks, day tanks afford a means of checking consumption and provide a constant head of pressure for process pumps.

Processing ACTH in Stakes Vacuum freeze-drying equipment at Armour Laboratories, Chicago, Illinois.

Modern Benefits

to the hog from the hog

by Vacuum Processing



Vacuumfreeze-drying of hog chalera serum at Pitman-Moore Laboratories, Zionsville, Indiana.



New serums made by vacuum freeze-drying give promise of wiping out the plague of hog cholera which for a century or more has cost the world incalculable millions of dollars.

New hormones made by vacuum freeze-drying from hog glands are effecting dramatic alleviation or cure of arthritis and many other diseases.

Vacuum freeze-drying — one of many modern techniques pioneered by Stokes and carried out commercially with Stokes equipment — captures life, defies oxidation, halts aging, preserves potency, for the benefit of mankind.

Stokes engineers invite consultation on modern vacuum techniques of chemical processing — drying, impregnating, metallizing — of pharmaceuticals, chemicals and many industrial products.

STOKES

STOKES MAKES

Photics Molding Process.

Industrial Tablettin

and Powder Metal Present,

amenda eduloment

Value of Property Company

F. J. STOKES MACHINE COMPANY, SOME TABOR BOAR, PHILADELPHIA 20, PA.

Quality... Filtration

SPARKLER FILTERS

High quality, sharp filtration has always been one of the prime features of Sparkler Filters. Many times Sparkler Filters have been chosen by experienced filtration engineers for this one point of superiority.

Here's why

... any kind of filter paper, cloth, or screens, and any filter media can be used to obtain maximum efficiency.
... no breakage of the filtering surface even with intermittent operation as pressure is not required to hold cake in position on the horizontal plates.

. . . flow is always with gravity, down through the cake in a natural direction. The cake will not break, crack or slip because it is supported in a horizontal position and is not subject to tensile or distortive strain.

When you are looking for fine quality filtering, Sparkler Filters will do the job.

For personal engineering service write Mr. Eric Anderson.

> Sparkler representatives in all principal cities.

SPARKLER MANUFACTURING COMPANY

Mundelein, III.

Sparkler International, Ltd. Sparkler Western Hemisphere Corp. engrocht 568, Amsterdem, Holland Mundelein, M., U. S. A.





Pot Rooms Going Up

Kaiser Aluminum & Chemical Corp. has poured its first aluminum at the Chalmette plant near New Orleans. The plant, with an annual output of 200,000 tons, will consist of two units of four 960-ft. potlines each. Above, the first unit nears completion. At the left, construction begins on the second. Completion of the entire project is scheduled for mid-1953. The plant will generate its own electricity in two power installations with a combined capacity of 478,200 kw., one-half the electrical output of Boulder Dam. Cost: \$148 million.

—End

News Briefs

Radiological Warfare: Menlo Research Laboratory has developed an atomic dogtag that records exposure to radioactive particles. These coinsize dosimeters made from silverbearing phosphate glass can be imprinted with the bearer's name, address and blood type. When placed under ultraviolet light, the tags fluoresce with an intensity proportional to the radiation received.

Instruments: Most makers and distributors of scientific instruments and laboratory apparatus will have their biggest year in 1952, according to J. Claire Evans, president of Scientific Apparatus Makers Association. Backlogged orders for many companies already total as much as half a year's normal production.

Propane: More propane will be available as a by-product of new cracking plants proposed for the Vancouver, B. C., area. Propane fuels like Rockgas have dropped in price as a result of major oil developments in Alberta. One company, Bottled Gas, Ltd., has added new facilities and expects to service 15,000 homes in the next few months.

Plutonium: A heavy, long-lived isotope of plutonium, plutonium

242, recently produced at University of California's radiation laboratory, may become a key building block for new transuranium elements and isotopes. The half-life of plutonium 242 is 500,000 years compared to 24,000 for plutonium 239. Thus the new isotope will not have the extreme radioactivity that makes other transuranium elements liard to handle.

X-ray Microscope: Stanford University has developed an X-ray microscope that gives magnification of 150 diameters and can resolve objects as small as a hundred thousandth of an inch. It will be extremely useful in examining living process, such as cancer cells. The electron microscope, whose maximum resolving power is about one ten millionth of an inch, cannot be used for such study, since it operates in a vacuum.

-End

-LITTLE BONERS



The Migrant Bolt

A midwestern processor of agricultural materials had just installed a new press. Its function was to take the water out of the bran in the feed mixing house.

The installation had been completed, but it simply wouldn't work. A hydraulic system on the choke come was out of order, and in a bad way. When the cone was down it wouldn't go up-and when it was up it wouldn't go down.

Three engineers ran around the place for almost a day trying to figure out what had hexed that hydraulic system. Finally they called in a maintenance man and asked him to start work with his wrenches.

Then it was found: a one-inch bolt that had been wandering about in the system from one control valve to another, causing all sorts of peculiar things to happen.

Do you recall a true little boner? Address the Editor, Chemical Engineering, 330 West 42nd St., New York 36, N. Y.

FREE DRAINAGE

IN SPARKLER FILTERS



High flow rates cannot be assured by large filtering surfaces alone. Another important factor is provision for drain-off space capable of carrying away all liquid that the surfaces can handle.

In Sparkler filters, the Free Drainage design of Sparkler horizontal plates eliminates one of the primary causes of liquid flow frictions — providing a clear, unobstructed channel through which filtered liquid can drain rapidly and more completely. To accomplish this, Sparkler uses a series of smooth, widely spaced butzons as the means of supporting the filtering surface, thereby ending the need for heavy wire mesh or other types of media support that have high coefficients of friction.

Features such as these, hidden from the eye, are typical of standard Sparkler construction, and are responsible for Sparkler superiority. Coupled with highest quality, operational economy, and simplified maintenance, free drainage makes Sparkler filters ideal for every filtering need and makes them particularly well adapted to the filtration of viscous liquids.



Available in a complete range of sizes and materials.

Write for your copy of our new catalog.

SPARKLER MANUFACTURING COMPANY

Mundelein, Illinois

Sperkler International, Ltd. Herangracht S&B, Amsterdam, Halland Sperkler Western Hemisphere Corp Mundelein JH., U.S. A

Readers' Views & Comments

More Corrosion Data

Sir

I was very much interested in your corrosion charts for furane cements . . . starting on p. 268 in your December issue.

Do you have available similar charts on metals such as lead, copper, aluminum or stainless steels? I am anxious to see charts on any of the metals, particularly copper.

JOHN B. GRANT Engineering Department Ingersoll-Rand Co.

Painted Post, N. Y.

▶ Yes. Editor Hoover is now working along with a number of companies to prepare similar charts for all major types of materials of construction used in the chemical process industries.

Our Corrosion Forum department will cover silicate cements in March. This will complete the present cement series of charts: plasticized sulphur cements in this issue (p. 288), phenolic cements in January, and furane cements last December 1.

Tantalum will be covered in April, followed by aluminum, carbon, Hastelloy, lead. Worthite and other materials.—Ep.

Who Wants Reprints?

Sir:

Your commodity surveys are excellent . . . and so is your rate of progress in improving an already good magazine.

How about reprinting the commodity surveys each year in one volume or on a monthly basis? I would be willing to subscribe to them on a regular reprint basis along with your special reports. The magazine is difficult to bind... so one is reduced to cutting up the volume or plowing through many bulky volumes to find the parts he most often refers to.... What can you do?

Director Research & Development Dept. Godfrey L. Cabot, Inc. Boston, Mass.

▶ We reprint all our feature reports, some articles and a few departments. We'll be glad to extend this service if the demand is large enough to cover our mechanical and handling costs. What are your wishes?

We've just discontinued our commodity surveys as a department; instead, commodity news will now appear in our regular Chemical Engineering News deparment. We believe this will enable us to give you better and more timely news on chemical commodities.—Fp.

A Chemical Corps Private . . .

Sir

Your publication of Major General Bullene's official memorandum on utilization of technical personnel in the Chemical Corps (November, p. 143) has been studied with great interest here by 109 such draftees.

Sixty percent of these hold chemical engineering degrees; the remainder are graduate chemists or engineers in other fields. For the most part, the experience has been a bitter one. . . .

At Ft. Myer, in the shadow of the Pentagon, a rosy picture was painted and we were assured we would be reassigned to duty "commensurate with education and experience."

We were assigned to the Chemical Corps at this installation, and our orders carried this strange inscription:
"... to be assigned to duties which will properly utilize qualifications as defined by par 4 a (1) (a) SR 615-205-1 in designated category (chemical engineer) and that any time such utilization is not being accomplished ... will be reported to ... Ft. Mycr for reassignment."

To date, a year later, not one of the 109 men covered by these orders has been assigned to technical duties of any nature whatsoever and not one has been referred to Ft. Myer for reassign-

Upon our arrival, the commanding officer was amazed that more chemical engineers had been added to his overbulging roster. Without further ado, we were assigned to . . . picking up scrap metal, paper and wood that covered the area.

Since then, with each step backward, we were honored with a heartwarming chat from our detachment officer . . . but the duties are still substantially what they were a year ago. During the summer, a large number of civilian undergraduate students were hired (many more than the work required) for what little scientific work is carried on . . . while 61 graduate chemical engineers picked up garbage or did police duty.

Our total net worth "to Army and to United States": somewhere deep in

the red . . . there is no place in the U. S. Army for an inducted engineer except on a front line pulling a trigger. From information we have gathered from others known to have gone through Ft. Myer and assigned to other places it becomes painfully clear that this situation is not unique to this installation or the Chemical Corps.

It has been said that everyone in the Army attempts to build himself a kingdom. Our presence facilitates requisition of greater sums of money for "research and the tools of research" which, in turn, will entail higher rank for those in command . . without GI technicians, appropriations for this center would certainly diminish.

At first we imagined the human waste ... to be enormous, but we have since learned that the material waste far outweighs it. It would take an army of bookkeepers to learn how taxpayers' millions have sifted into these wastes ... and an army of senatorial committees to investigate those involved...

Private First Class Chemical Corps U. S. A.

► Thanks, Soldier X, for this illuminating—albeit discouraging—communique. Your plight and that of your 60 chemical engineering buddies are in marked contrast with what we observed at Army Chemical Center last Fall. Such conditions violate the spirit if not the letter of General Bullene's order. We intend to extend our investigation. Let's hear from other fronts.—Eo.

Geography and Productivity

Sir.

In my study on regional factors of the aluminum industry... I have had frequent occasion to use your articles by Chilton on estimation of plant costs and process input requirements.

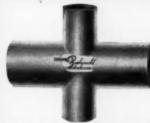
I have had occasion to check the closeness of the "six-tenth factor" rule on steam electric power stations. The difference in cost between first units and later expansions (after correction for construction and equipment cost changes) are very closely approximated by a 0.65 factor. Results obtained by calculations with the 0.65 factor understated the actual (as corrected) costs by only 2.35 percent, with a standard deviation of some 3.5 percent.

Since my study explores regional cost differentials, it is possible that you

TRI-CLOVER THE COMPLETE LINE

"ZEPHYRWELD"® WELDING
FITTINGS . . SS Type 304,
347 and 316—Income and other
SS analyses. Febricated in 0.0.
Tube Size, ½ in. thru 24 in.—
ells, tees, edapters, als. Covared

in Catalog 748.



SCHEDULE 55 and 105 WELDING FITTINGS . . . "Zephyrweld" SS Type 204, 347 and 316, full range of sizes from ½ in. thru 24 in. pipe, for use with Szionless light gauge pipe. Covered in Catalog 1851.



CONICAL END FITTINGS . . . Stainless Type 316
— Incomel and other SS analyses. Complete line, sizes from 1 in. oftha 4 in. 0.D. Features: Light weight — law cost — fast installation — leak-tight — easily adapted to other fitting types. Covered in Catalog 845



RECESSED-END FITTINGS . . . Stainless Type 304-347-316. Low cost, light weight fittings fer fast, simple soldering, brazing or socket welding. Sizes from Y_2 in. thru 24 in. Full line of elbaws, text, odapters, etc. Covered in Catalog 948.



SANITARY TYPE FITTINGS . . . Stainless Steel and Tci-Alloy (Nickel Alloy), from 1 in. thru 4 in. O.D., full range of filting types. Approved as meeting 3A Standards throughout, incorporating acclusive design features. Covered in Catolog 150-8.



SCREWED FITTINGS . . . Stainless Steel Type 304-347-316. Complete range of fitting types. Maets the domand wherever flanged and screwed fittings are required. Clean-cut, accurate 1.P.S. threads. Covered in Catalog 451.



PREFABRICATED FITTINGS . . . such as this butt-welded, flanged assembly, available in a wide range of types and sizes to meet special requirements.



STAINLESS STEEL TUBING AND PIPE . . . a most complete line, in all popular steinless analyres, wide size range, polished or unpolished.



INDUSTRIAL VALVES
... Tri-Clover offers a wide selection of standard and special design valves in a wide range of types and sizes to meet practically every corresion-resistant requirement.



HEW PUMP CATALOG 250 . . . cantains complete pump data never before published — cavers the full 1951 Tri-Clover Pemp Line for every application. Write for your capy naw.

Here you see representative fittings, valves, pumps, gubing and pipe that go to make up the complete Tri-Clover line—all available from one source. Install these stainless steel or alloy products in your process lines and realize the advantages of increased production and lower maintenance cost. 32 years of specialized experience in solving corrosion piping problems can be yours by consulting our engineers.

Write for details, or see your nearest Jobber.



TRIALLOY AND STAINLESS STEEL SANITARY PITTINGS, VALVES, PRIMPS TURING, SPECIALTIES



FASEICATED STAINLESS STEEL INDUSTRIAL FITTINGS AND INDUSTRIAL PUMPS

THE Complete LINE

"THE MASTER OF FLAME"

in advanced engineering design and functional dependability . . .

in fire-stopping effectiveness with inexperienced operators . . .





MODEL 20-B

DRY CHEMICAL FIRE EXTINGUISHING EQUIPMENT

Ansul Dry Chemical Fire Extinguishers were FIRST with the GREAT-EST FIRE-KILLING RATINGS ever attained by hand and wheeled portable fire extinguishers*. No type or make of extinguisher has ever exceeded Ansul's effectiveness ratings for flammable liquid fires. Ansul features include: 1) Patented nozzle which provides the most effective stream pattern for quick extinguishment of fires . . . in addition to forming a heat-shield for the operator. 2) Water-tight and corrosion-resistant construction. 3) Easy, on-the-spot recharging after use without special tools . . . and many others.

Ansul Chemical Company is the only fire extinguisher manufacturer maintaining extensive chemical research laboratories in addition to a large engineering staff for research and development to maintain and improve the quality of its products . . . Plus the most extensive, best-equipped proving grounds in the industry.

Ansul "PLUS-FIFTY" Dry Chemical is non-corrosive, nonabrasive and non-toxic. It is safe to use on electrical fires of any voltage. And ANSUL extinguishers need only be inspected annually, NOT RECHARGED, adding ECONOMY to GREATER FIRE-STOPPING EFFECTIVE-NESS.



Get the facia. See compara-tive effectiveness ratings for various types of approved fire extinguishers based on tests by nationally recognized ap-proval agencies. Write for file No. 394. You will re-ceive complete information and other valuable data.

CHEMICAL COMPANY

Fire Extinguisher Division OFFICES AND DISTRIBUTORS IN PRINCIPAL CITIES IN THE U.S.A., CANADA AND OTHER COUNTRIES ALSO MANUFACTURERS OF INDUSTRIAL CHEMICALS, REFRIGERANTS AND REFRIGERATION PRODUCTS

READERS' VIEWS, COUL. . .

plants?

JOHN V. KRUTILLA Harvard University Cambridge, Mass.

would have regional averages of these

input requirements for aluminum

Northeastern aluminum plants may require very slightly more total power than plants in the South because of greater radiation losses with a colder average yearround climate.

Regional differences in labor produc-tivity are commonly recognized in the construction trades. But in a chemical process plant, where an operator's duties are well prescribed, the major difference in productivity would come from possible longer fatigue allowance for workers in the vicinity of high-temperature furnaces or cells.

We do not have specific figures on the influence of climate on labor productivity or energy requirements, but we doubt if they vary appreciably in the U. S .- ED.

That Prisoner Again

I was interested in the "Spanish Prisoner's Letter" you published in November (p. 264). Since I didn't get one, maybe Sr. "P" hasn't gotten around to Long Beach yet. . .

But tell me, is anyone ever actually taken in by such an obvious racket?

P. A. ARMOND

Long Beach, Calif.

Dh. ves. We're told one of the most recent victims was a prominent physician in the South. He was fleeced of \$15,000. -En

MEMO FROM THE EDITOR

(Continued from page 139)

When we get a good manuscript that we believe is too long, we usually ask the author if he'll condense it or allow us to condense it. Very few refuse.

► We Want Manuscripts-All this may sound like we're so critical that we don't encourage and solicit manuscripts. That's not true; we welcome them at all times, would like to get

If you have an idea for an article you'd like to do, we recommend that you write us first and tell us a little about it. An outline will do. And keep in mind the basic questions I've mentioned in this memo.

Then we'll be able to tell you promptly whether we think your article fits best into Chemical Engineering or into some other publication. And besides, we can sometimes tip you off to little tricks in preparing it that'll save you time and effort.



SORBITOL IS USED FOR:

Candy Shaving Cream
Cellulose and Paper Products Shoe Dressings
Cosmetics Shredded Coconut
Dentifrices Textile Finishes
Gelatin Tobacco
Pharmaceuticals Water Soluble Resins

GLUE SPECIALTIES:

Bookbinding Glues Cork Binders
Greaseproof Composition Non-warp Glues
Printers' Rollers Vegetable Adhesives

FOR SYNTHESIS OF:

Resins Varnishes
Surface Active Agents Vitamin C

Atlas sorbitol is available . . . at a low, stable price . . . in sufficient quantities to meet most present and future polyol (polyhydric alcohol) needs!

Atlas sorbitol is *not* affected by raw material shortages, war, or wild price fluctuations. It is derived from an almost inexhaustible supply of sugar!

Versatile sorbitol and related polyols...members of the same chemical family as glycerin and the glycols...have outstanding qualities for conditioning many types of products and for synthesis. It is not a substitute.

Manufacturers of adhesives, printers' rollers, pharmaceuticals, cosmetics and a host of other products look to Atlas for their polyol requirements. Why don't you?

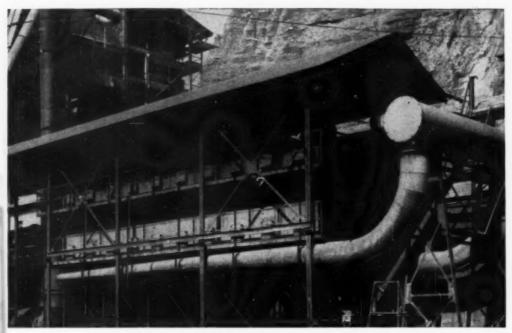


Industrial Chemicals Department

ATLAS POWDER COMPANY

WILMINGTON 99, DELAWARE - OFFICES IN PRINCIPAL CITIES ATLAS POWDER COMPANY, CANADA, LTD., BRANTFORD, CANADA

PROVED FOR YOUR JOB ...



Typical Drocco installation: Automatic Filters collect taxic arsenic dusts produced in copper refining operations at Cerro de Pasco Copper Co., La Oraya, Peru

.. BY Thousands of Installations

High efficiency and long operating life of industrial dust control equipment depend on two important factors: (1) the dust control experience and engineering "know-how" of the manufacturer and (2) the quality of materials and operating life "built into" the system. Thousands of high-efficiency dust control units and systems designed and built by Dracco furnish operating proof of both these factors.

Thirty-five years' experience devoted exclusively to dust and fume control have provided Dracco engineers with invaluable design, engineering, and operating knowledge. This knowledge has enabled Dracco engineers to solve many dust problems—resulting in substantially improved operating and plant conditions in almost all of the process industries.

When you think of dust control, remember DRACCO—the name, the engineering skill, and the dust control system that will successfully solve your problems.

DRACCO CORPORATION

Harvard Avenue and East 116th 5t. Cleveland 5, Ohio

Full information on Dracco equipment as applied to your specific problem may be had by contacting your nearest Dracco representative or Department C-2, Cleveland, O.

DUST CONTROL EQUIPMENT · PNEUMATIC CONVEYORS



WELDING FITTINGS ON YOUR MIND

It will pay you to think of Midwest whenever you think of welding fittings. For example: the variety of elbows offered only by Midwest provides greater latitude in piping design and permits improvements and economies not otherwise possible.



Same radius as ASA but tangue equal to 25% of nominel pipe siz on each end. Saves pipe, layout an welding time. Costs no more tha ASA. Sizes to 24°.



Recommended where space limitations do not permit use of "Long Tangent" or ASA Elbows. Sizes to 30".



Dimensions conform to applicable size range of American Standard for Butt-Welding Fittings, ASA B16.9. Tolerances much less than allowable, Sizes to 26°.



Takes the place of a straight size allow and a reducer. Eliminates on weld, reduces pressure drop, easie to insulate. Sizes to 12", reduction to half size.

4580

MIDWEST

Main Office, 1450 South Second Street, St. Louis 4, Mo

Plants: St. Leuis, Passalc, Los Angeles and Boston

Seles Offices: New York 7—30 Church St. v Chicage 3—79 West Mannee St. v Houston 2—173 Cepitel Ave. Les Angeles 23—520 Anderses St. v Houston 2—173 Cepitel Ave. Todas 3—274 Winds Mids. v. Backer 27—474 First M.

STOCKING DISTRIBUTORS IN PRINCIPAL CITIES

The Corrosion Forum Edited by Morgan M. Hoover





Applications: carbon-filled sulphur cement in HNO2 and HF service (left), and sulphur cement in a dyestuffs plant (right).

Sulphur Cements

For your files: the corrosion resistance of plasticized silica-filled sulphur cements used for joining bricks, tile and cast iron pipe.

RAYMOND B. SEYMOUR & ROBERT H. STEINER The Atlas Mineral Products Co., Mertztown, Pa.

Sulphur cements are available commercially as simple mixtures of fillers with sulphurs and as homogenous plasticized-filled sulphur ingots possessing low coefficients of expansion. Carbon-filled sulphur cements are superior for service in the presence of fluorides or hydrofluoric acid but this accounts for less than 10 percent of all sulphur cements used. Most of the resistance data reported in the following charts were obtained from tests on plasticized silica-filled sulphur cements but data for hydrofluoric acid and its salts were obtained from tests on carbon-filled sulphur cement.

Sulphur cements have been used for over fifty years for joining cast iron pipe and during the past two decades, Thiokol-plasticized silica-filled sulphur cements have been accepted as a standard material for joining brick and tile in tanks, floors, sumps and drains. Sulphur cements are resistant to non-oxidizing acids and salts but should not be used in the presence of alkalis, oils, greases or solvents. Since sulphur undergoes a change in crystalline structure at around 200 deg. F., sulphur cements cannot be

used above this temperature. Plasticized sulphur cements have been used at higher temperatures when protected by brick joined by chemically resistant resin cement. This dual construction is considered standard for high temperature pickling of steel with sulphuric acid whereas carbon brick joined with carbon-filled sulphur cement is considered standard for

Notice . .

This is the third in a series of chart data presentations giving corrosion data for various materials of construction vs. a number of corrosives. Data for the corrosives of particular interest to you will be increased as the coverage grows to include all of the major materials of construction.

Coming:

Silicate Cements, March 1952 Tantalum, April 1952 Already Published:

Furane Cements, December 1951 Phenolic Cements, January 1952

Reprints of the series already published are available at 25c. each. Address Editorial Dept., Chemical Engineering, 330 West 42nd St., New York 36, N. Y. pickling aluminum or stainless steel with nitric and hydrofluoric acid.

Thiokol-plasticized sulphur cements can be melted at 265-290 deg. F. and are usually poured in two steps in order to minimize the effect of shrink-Since no chemical reaction is involved with the setting of sulphur cements, structures formed from these materials may be used just as soon is the joints have cooled. An underlay of an impervious membrane such as synthetic rubber or plastic is customarily used beneath brickwork joined with sulphur cements in steel structures but when rigid structures such as concrete are to be protected, the underlay may be an asphaltic composition.

Silica-filled cements are essentially non-conductors whereas the carbon-filled sulphur cements are fairly good conductors of electricity. Silica-filled cements are not affected by salts, such as copper salts, under storage conditions but cannot be used for electrolytic processes due to the formation of metalic sulphide. Typical values for properties of sulphur and plasticized sulphir cement are compared below.

Property Water absorption, % Tensile strength, psi, 'compressive strength Coefficient of expansion (In. F. × 10-4)	Sulphur < 0.5 180 1806 45	l'insticized Sulphur Cement < 0.5 600 6000 15
Density	2.0	2.2

Similar precautions and limitations to those listed previously for polyfurfuryl alcohol and phenolic cements should be considered in the use of the accompanying charts.



Banish Corrosion with "KARBATE"

Impervious Graphite Towers

"KARBATE" TOWERS do more than retard corrosion — they eliminate it entirely from such processing operations as absorption, fractionation, evaporation, extraction, scrubbing, and many others. Furthermore, the widespread acceptance of impervious graphite for all types of corrosion-free process construction has resulted in the manufacture of monolithic tower sections and fittings in sizes to 24" I.D.

For example, the tower illustrated here incorporates the following standard components: bottom section with gas inlet, liquor outlet and support grill; intermediate section with hand hole and packed with carbon Raschig rings; short intermediate section; top section with "Karbate" feed assembly and wier plate distributor; and cover with gas outlet. All sections and fittings, including spring-loaded tie rods and heavy-steel pressure plates, are available for quick assembly to your specifications.

All openings are of adequate size. Generous gas-liquid disengaging space is provided in the top and bottom sections.

"Karbate" Impervious Graphite is in widespread use today. The increasing demand for corrosion-free processing equipment indicates that it will be the universally preferred construction material of tomorrow. For *only* impervious graphite can give you this unique combination of properties:

- * STRENGTH AND EASE OF INSTALLATION
- SIMPLICITY OF FABRICATION AND MODIFICATION IN THE FIELD
- · HIGH HEAT CONDUCTIVITY
- * RESISTANCE TO CORROSION AND THERMAL SHOCK
- NON-CONTAMINATION

The term "Karbate" is a registered trade-mark of Union Carbide and Carbon Corporation

NATIONAL CARBON COMPANY

A Division of Union Carbide and Carbon Corporation

30 East 42nd Street, New York 17, N. Y.

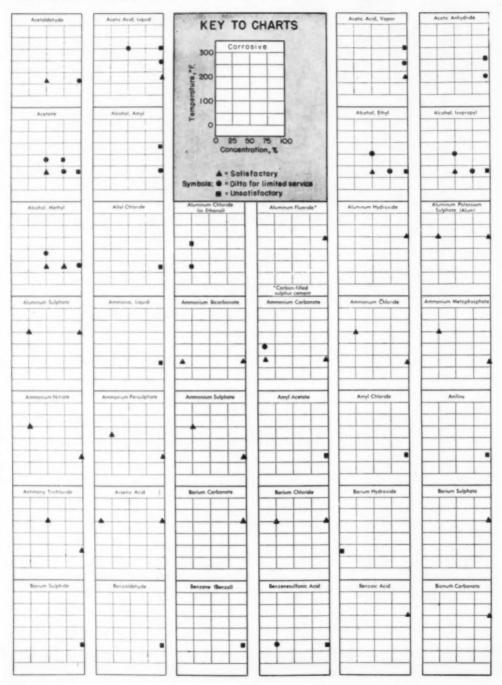
District Sales Offices: Atlanta, Chicago, Dallas, Kansas City, New York, Pittsburgh, San Francisco

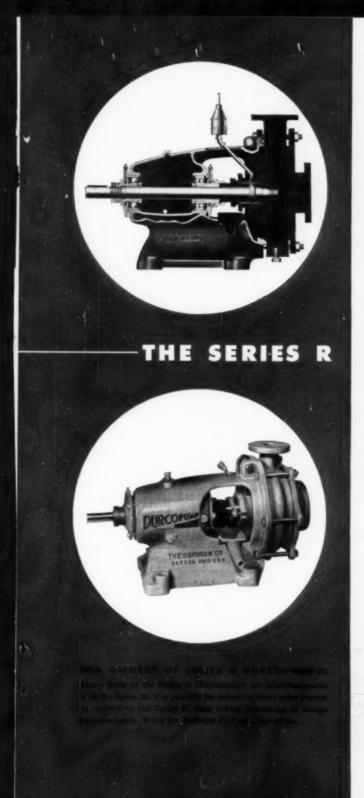
In Canada: National Carbon Limited, Montreal, Toronto, Winnipeg

OTHER NATIONAL CARBON PRODUCTS =

HEAT EXCHANGERS . PUMPS . VALVES . PIPING . TOWERS . TOWER PACKING . BUBBLE CAPS . BRICK . STRUCTURAL CARBON . SULPHURIC ACID CUTTERS . HYDROCHLORIC ACID ABSCRBERS

Corrosion Resistance of Plasticized Silica-Filled Sulphur Cements





For acid handling:
THE NEW
DURCOPUMPS
PROVED
IN ACTUAL
SERVICE

DURCOPUMPS -

In actual service for more than a year, the Series R Durcopumps incorporate the best features of the earlier Series M Pumps with design changes which have improved performance and reduced maintenance.

Wet ends, of course, are interchangeable for meeting changing conditions. Among other improvements are a better stuffing box design, through-bored frame for positive alignment, and a more rugged impeller and heavier shaft for better balance and longer life. All features of the Series R Durcopumps are discussed in Bulletin P/1.



THE DURIBON COMPANY, INC. Dayton, Ohio

When you use

DARCO G-60



you get

maximum

results

with

minimum

doses!

No other activated carbon can approach Darco G-60 in the "spectrum" of its high adsorptive capacity for a large variety of applications. This is the standard carbon for chemical research. And now it is available to you in quantity—by the carload if you like.

What's more, in addition to high adsorptive capacity, Darco G-60 gives you the ideal combination of high purity, low retention loss, and maximum filterability.

Write for the complete story of Darco G-60 and a sample of this outstanding carbon.

IMAGINUITY AT WORK .

To eliminate trace quantities of aldehydes and other impurities, try permanganate impregnated Darco G-00 made as follows: Shake 5 grains of Darco G-00 with 100 ml of 0.01% KMn04 solution. Filter and drain well. Use Darco G-00 filter cake for treatment of the solution to be purified. May also work for other oxidisable impurities.

DARCO G-60
Highest purity...by the gram or carload



CORROSION FORUM, cont. . .

Sulphur Cements (key on p. 290)

Boric Acid (Borocic Acid)	Bromine (Dry)
•	
Bromine (Liquid)	Butyl Acetete
	1 1 1
•	
Butyric Acid	Colcium Corbonate
•	
4 0	
Calcium Chlorota	Calcium Orlande
Carcian Cristian	Conton Cristian
Colcium Hydroxide	Colcium Hypochlorite
Colcium Hydroxida	Conclum Phypochionile
	•
Calcium Sulphate	Camphor
	-
Carbonic Acid	Carbon Bisulphide
•	
(Cont	inued on many 204

(Continued on page 294



For 25 years U.S.P. Glycerine has helped put the eye-appeal and taste-appeal in Curtiss marshmallows. Each fluffy marshmallow is firm, never granular. There's no "weeping" or separation. Shelf life is longer. Glycerine adds freshness that you can see and feel! With absolute safety—proven by years of consumer acceptance.

U.S.P. Glycerine has literally hundreds of applications in food and confectionery processing. The whole story—neatly wrapped in a handy 16-page booklet—is yours for the asking.

GLYCERINE PRODUCERS' Association

295 Madison Avenue New York 17, N. Y.

	Please send a copy of "Why Glycerine for Fo	ods?"
Name	Title	
Company		- · · ·
Address		-
City	Zone State	



There's more than meets the eye

HAMMOND Multi-Wall

BAGS





Photo shows "tubes" coming off large tuber, from which they are conveyed to sewing machines, where they are made into Sewn Trop Multi-Walls.

- * Highest quality papers and materials
- * Modern machines ... Skilled personnel
- * Efficient plant operations

Satisfied Hammond customers in the chemical industry know that all multi-wall bags are not alike. The combined efforts of progressive management, conscientious and thoroughly trained personnel, and expert sales engineers who thoroughly understand the problems of shipping hundreds of products —are the primary reasons for the superiority of Hammond Multi-Wall Bags.

Write for booklet—"To Serve You Better with Hammond Multi-Wall Bags."

HAMMOND BAG & PAPER COMPANY

General Offices: Wellsburg, W. Va. . Plants in Wellsburg, W. Va. and Pine Bluff, Ark.

CONTINUOUS

CONTINUOUS

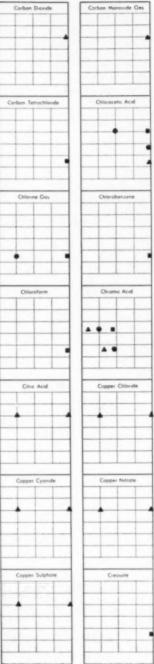
COOLING

COOLIN

CORROSION FORUM, COIII. . .

Sulphur Cements (key on p. 290)

Corbon Double Corbon Monoulde Ce



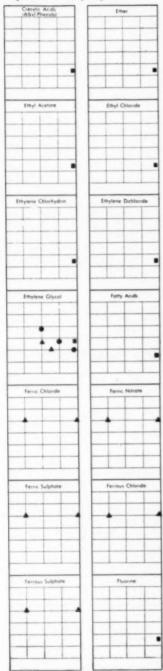


WYSSMONT COMPANY

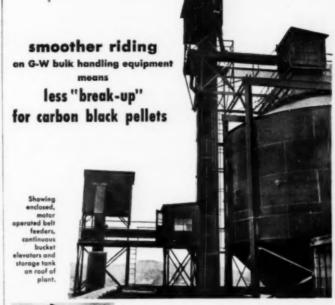
DRYING ENGINEERS

31-06 Northern Boulevard . Long Island City 1, N. Y.

Sulphur Cements (key on p. 290)



(Continued on page 296)





Slaw speed continuous bucket elevator carries pellets from conveyor beneath track level to roof storage.



Unloading from one of the hopper ports through the automatic car sealing valve.

(f) 6178

G-W specialty. A typical example is the system illustrated here for conveying and elevating pelletized carbon black from hopper car to process. Advantages of this type of installation are many, some of which are:

1—Curbon black dust is virtually elimin-

Materials handling systems for bulk chemicals is a

- 1—Carbon black dust is virtually eliminated since the system is completely enclosed from automatic car sealing valves through storage bin to process.
- 2—Valuable floor space is released since bulk storage can be located on roof or any other outside point.
- 3—Handling is automatic which eliminates up to four separate handling operations, necessary when carbon black is used in non-pelletized form.
- 4—One man can unload a full car in less than six hours, his only manual effort being to fasten unloading chutes to car ports.

If you have a problem handling chemicals in bulk, be it carbon black; soda ash, sodium sulphate, chrome ore, bauxite, etc., consult a G-W Materials Handling Engineer. He is backed by 136 years of engineering design and knowledge in the materials handling field. His recommendations, drawn from this extensive experience can point the way to more economical movement and storage of materials in your plant.

GIFFORD-WOOD CO.

Since 1814

HUDSON, N. Y.

420 LEXINGTON AVE. NEW YORK 17, N. Y. RAILWAY EXCHANGE BUILDING ST. LOUIS 1, MO. 565 W. WASHINGTON ST-CHICAGO 6, ILL.

WHEN YOU THINK OF MATERIALS HANDLING - THINK OF GIFFORD-WOOD

WE CALL 'EM

Waterproof Bags







ONE OF THEIR FUNCTIONS

Bemis Waterproof Laminated Textile Bags are extra strong, and they're specially constructed to guard against: Change in moisture content Sifting Escape of undesirable odors Loss from snagging and tearing Up to 5-Layer Constuction: l. Flexible creped kraft 2. Waterproof adhesive 3. Middle layer of paper 4. Waterproof adhesive 5. Outer layer of burlap This may be parchment paper, or various plastic films, depending upon your requirement.



Bemis

"America's No. 1 Bag Maker"

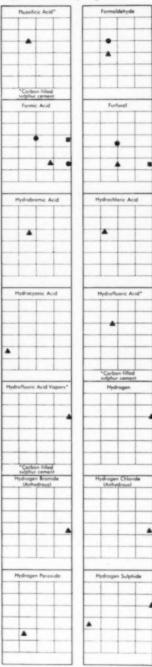
If you have a "hard-to-pack" product or one that must stand the rough handling of L.c.L. truck, or export shipment, it will pay you to investigate the advantages of Bemis Waterproof Bags.

MAYBE YOU NEED THESE, TOO

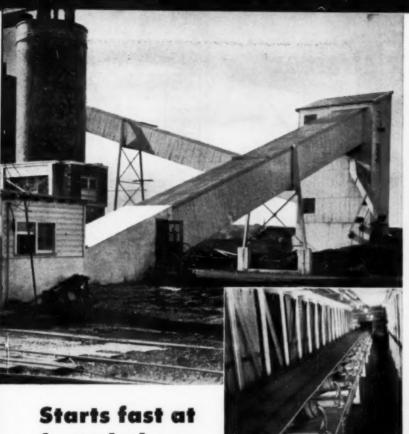
If you don't require the exceptional protection of Bemis Waterproof Bags, Bemis Multiwall, Cotton or Burlap Bags are your best bet.

WHATEVER KIND OF BAG YOU NEED, WE MAKE IT! CORROSION FORUM, cont. . .

Sulphur Cements (key on p. 290)



(Continued on page 298)



forty below...

This belt conveyor carries coal from railroad cars to overhead hoppers for a power company located in the northern part of the Midwest . . . so far north that temperatures frequently hit forty below zero. Starting the conveyor in that kind of weather meant lost time, wasted manpower. The bearing lubricant became so stiff that five or six men often were required to pull on the belt. Three hours a day frequently were lost in getting the unit in operation.

As many as a dozen conventional lubricants were tried without success before a change to STANOLITH Grease No. 42 was made on the recommendation of a Standard Oil lubrication specialist. None could match the ability of STANOLITH to provide easy starting at extreme low temperatures, and still maintain effective lubrication during high summer temperatures.

STANOLITH Greases are filling the bill in a wide range of industrial and processing applications because of their resistance to heat and to the washing action of water, and their ability to flow readily under wide variations in temperature. A Standard Oil lubrication specialist can help you take advantage of these special properties. A call to your local Standard Oil Company office is all that's necessary. Or write: Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.

STANOLITH Greases

What's your problem?



Meet R. R. Rowlands, of Standard's La Crosse office. He is the lubrication specialist who worked with this power company to find the right grease for an especially tough job. And as a result of his work, the company was able to save considerable time in the operation of a coal conveyor.

His on-the-job service is typical of that available to all midwest plants through a corps of such lubrication specialists. You can be sure that the specialist in your own area has both the practical experience and the training in a Standard Oil Lubrication Engineering School that will result in dependable, thorough assist-

Why not call your local Standard Oil Company office today? Put a lubrication specialist to work on your problem now. When he calls, be sure to discuss the advantages and performance records of these outstanding products:

STANOIL Industrial Oils-This multi-purpose line of oils provides cleaner operation of hydraulic units, supplies effective lubrication in air compressors, gear cases, and circulating systems. One or two grades can replace a wide variety of special oils and lubricants.

CALUMET Viscous Lubricants—These greases strongly resist washing and throw-off. Their superior wetting ability affords better coating of open gears and chains, better internal lubrication of wire ropes.

STANDARD OIL COMPANY



(Indiana)

heart of the strainer

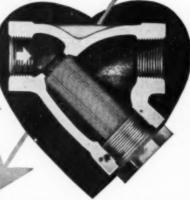
A high-grade, woven Monel wire screen is the heart of the Yarway Strainer—one reason why hundreds of thousands of these strainers are policing pipe lines in nearly every industry.

OTHER REASONS -

- cadmium plated bodies and screen caps
- straight threads, machined faces and spark-plug-type gaskets on screen caps
- ten sizes from 1/4" to 3"

Sold by 216 industrial distributors. Write for Bulletin S-203.

YARNALL-WARING CO. 137 Mermaid Ave. Philadelphia 18, Pa.





STRAINERS

GOT BULK STORAGE PROBLEMS? ...solve them with

Kalamazoo

GLAZED TILE
INDUSTRIAL
STORAGE BINS

Coal . . . cement . . . clay . . . plaster . . . fertilizer . . . whatever the material, Kalamazoo glazed tile hollow-wall construction protects it from condensation, freezing and corrosion . . keeps it always clean and dry . . eliminates waste, shrinkage, spoilage.

And, the clean-cut neatness of Kalamazoo Glazed Tile Storage Bins complements the appearance of modern industrial buildings... an added Kalamazoo advantage.

Write today for complete information.

TILE TANK DIVISION

224 HARRISON ST., KALAMAZOO, MICHIG

Kalamazoo TANK and SILO CO.

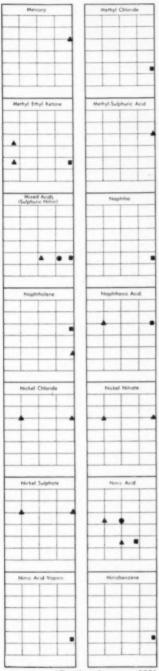


Corrosion Forum, cont. . .

Sulphur Cements (kep on p. 290)

Hypachlerous Acid		Indi		
	-			
	-		-	-
			-	
Lactic Acrd		Lend /	Acetate	
	-			
	-		-	
	-	-		-4
		-	-	
			-	-
4				
Linseed Oil	Ma	gnesion	n Carbo	nate
	-	-	-	-
	-	-	-	-
	-	-	-	-
•	-	-	-	-
	_			
Magnesium Chloride	Mi	gnesiu	m Hydro	oxide
1 1	•			
	-	-	-	-
	-	-	+	+
\rightarrow	•	-	-	-
	-		1	_
Magnesium Nitrate	M	agnesi	um Sulp	hate
4			1	-paramol
+ -				
1	-	+	+	-
•				
Maleic Acid		Mercur	ne Chlor	nde
Moleic Acid		Mercur	ne Chlor	nde
Maleic Acid		Mercur	ne Chlor	nde
Maleic Acid	•	Mercur	ne Chlor	ride
Maleic Acid		Mercur	sc Chlor	nde
Maleic Acid		Mercur	ne Chlor	ride
		Mercur	ne Chlor	nde
		Mercur	ne Chlor	ride
	•			
	•		ous Nitr	
	•			
	•			
	•			
	•			
	•			
	•			
	•			

Sulphur Cements (key on p. 290)



(Continued on page 300)



Dryer than the desert—extremely porous—the multitudinous particles in a sack of FLOREX FULLERS EARTH have a total surface area beyond belief, and an adsorptive capacity unequalled by any other natural material with which we are familiar.

If you are an industrial user of adsorbents for any purpose, Florex and other products of the Floridin Company should be of interest to you.

FLOREX FULLERS EARTH

High-pressure extrusion insures maximum effectiveness.

BAUXITE-BASED ADSORBENTS

Write for full data. The advice of a competent technical staff is offered. Your inquiry will get prompt attention.

FLORIDIN COMPANY

Adsorbents ... Desiccants ... Diluents

Dept. A, 220 Liberty St., Warren, Pa.



Designate To Meet the Flammable Liquid Hazards of Your Plant

Increased use of gasoline, alcohols, acetone or other flammable liquids creates serious hazards you may have overlooked in your plant. Check your present protection facilities now so you can meet sudden emergencies with fast, positive, fire-killing foam.

National Foam engineers can survey your plant, study risks involved, and then determine the type of foam protection best suited to your plant's requirements . . . mechanical or chemical foams . . . the most complete choice of devices available . . . Foam Chambers for large tanks, Overhead Spray Deflectors, Nozzles, Dip Tank or Drainboard Systems, or even small extinguishers and other devices . . . whichever is best suited to your particular needs. Large plant, or small, National Foam specialists are ready to engineer foam protection to meet the hazards of your plant.

Let National Foam engineers and chemists show you how to get the best foam fire protection today! Consult your nearest National Foam Distributor, or write us direct about your problem.



Corrosion Forum, cont. . .

Sulphur Cements (key on p. 290)

					. It.		-	
	Niltro	es Acid			8	Litrosyl	Chlorid	le
	1	1						
-	-		-	H	-	-		-
_	-			-				
-	-	-	-	h	_		-	-
								_
	Olei	c Acid				Oxali	c Acid	
								1
-	-	-	-	-	-		-	-
	-	-	-	14	-		-	-
								-
-	_				_	_		
				-	_			
(Oxidizio	9 Сен	PR.			Perchlo	ric Acie	d
					-			
					-	-		-
-	-		-	1	_	-		-
					4			
			-		_		_	
_	-			l	_			
-	-	lone		-		nospno	rie Aci	
			_					
			-		-			-
-							-	
_	-	-	-	-	-		_	-
	4	_						
P	hiholic .	Anhydri	de			Pierie	Acid	
_		_				GR A	COMO!3	
	-	-	-		-	-	_	-
	_	-	-	l -	_			
				ľ	-			-
				-				_
Pen	assium.	Bicarbo	nate		Po	Hussian	Brome	de
•		-		h	-4	-	-,	-
	-	-		-	_		_	_
•								
A								
		_			_			
-				-	_		-	_
Pol	- Chairman	Carbon	nate	-	Pi	Attasion	Chlen	the
			-		*			
			-	1	-	-	-	-
		-	_	-				
4	-							

(Continued on page 302)

CONTROL

mining refining manufacturing

POTASH

CHEMICALS

International

At its mine...at its refinery...at its chemical plant, International maintains a constant control over the production of potash salts and the processing of potash chemicals for many industrial purposes.

It's an exclusive three-way-control which means greater precision in production all along the line and offers you the advantages of consistent uniformity and deliveries that will fit your schedules.

When you specify International potash chemicals, you can be sure of quality, of accuracy of specifications and of ample tonnages to satisfy your requirements. Address Inquiries to Industrial Potash Department 20 North Wacker Drive, Chicago 6, 61 Broadway, New York 6.

potash chemicals Caustic Potash—All Standard Grades • Carbonate of Potash—All Standard Grades • Potassium Chloride—Refined and Technical Grades • Potassium Sulfate

International

potash division

INTERNATIONAL MINERALS & CHEMICAL CORPORATION

General Offices: 20 North Wacker Drive, Chicago 6



Bring you these Important Advantages:

- · APPROVED BY UNDERWRITERS' LABORATORIES
- ONLY 2/3 THE SIZE AND WEIGHT
- OUTSTANDING PERFORMANCE AND DEPENDABILITY

Plus-Simplified Wiring

Exclusive, Straight-Thru, Front Wiring offers time, space and labor savings up to 30%. Crossing and U-bending necessary with old-fashioned "scrambled wiring" are completely eliminated. All terminals and contacts are easy to reach, easy to wire and service. Installations are faster and neater; maintenance is simple and economical. Direct routing is safer and makes circuit identification fast and positive.

AVAILABLE IN SIZES 0, 1, 2, 3 and 4 WITH NEMA TYPES IV, V, VII AND IX ENCLOSURES. EXPLO-SAFE Push Button Stations can be supplied for every circuit requirement up to 600 valts A.C.

Send today for this fully illustrated booklet which explains why EXPLO-SAFE Sharters are best suited for Chemical Processing Industries. Complete with dimensional and rating data. There is so cost or obligation.

MAIL THIS COUPON FOR YOUR FREE COPY TODAY



AH	THE A	RI
	2602	н

THE ARROW-HART & HEGEMAN ELECTRIC CO.

INDUSTRIAL CONTROL DIVISION 602 HAWTHORN ST., HARTFORD 6, CONN.

YOUR NAME		
POSITION		
CO. NAME		
CO. ADDRESS		
CARRIE .	2011	

Corrosion Forum, cont. . .

Sulphur Cements (kep on p. 290)

	olessius	n Chlor	ide		Put	BOOLWIN.	Dichron	note
					-			
-	-		-	1	-	-		-
\vdash				h	-		-	
_		_		-	_			_
				L				
Pon	muicos	Ferrocy	onide	Г	Per	muisee	Hydros	ide
				lŀ				
\vdash	-			ŀ	-			
-		-	-	-				-
			-	-	_			
4	-			1	•			
,	Otessiu	m Nitro	Re		Pater	sium P		onole
				1				
				1				
-	-		-	1	-	-		-
		-	-	1		-		-
-	-		-	1			-	-
				-				
			-					
Pi	Massium	n Sulpho	ofe	ΙГ	Per	pylene	DicNo	ride
				1	-			
\vdash	-	-	-	H	_		_	-
\vdash	-	-		-	_	_	-	-
_		-		1				
\vdash								
								•
	Silver	Mirote				Sodium	Acetal	
	Silver					Sodium	Acetat	•
	Silver	Nitrate				ledum	Acetos	
•	Silver	Nitrate				ladum	Acetal	
•	Silver I	Shrots				iodum	Acutot	
•	Silver I	Nitrate				iodium	Acutot	
•	Silver	Nitrote				iodium	Acetos	
•	Silver	Sincis .				iodium	Acetol	
•			4					-
•		Nitrate	4				Acutot	-
•			A					-
•			4					-
•			60					-
•			69					-
•			a a					-
•			4					-
•			4					-
5.5		icuton	dia		5		Bis objection of the control of the	-
5.5		icuton	di d		5			-
5.5		icuton	4		5		Bis objection of the control of the	-
5.5		icuton	•		5		Bis objection of the control of the	-
5.5		icuton	A		5		Bis objection of the control of the	-
5.5		icuton	•		5		Bis objection of the control of the	-
5.5		icuton	•		5		Bis objection of the control of the	-
5.5		icuton	•		5		Bis objection of the control of the	-
5.5		icuton	•		5		Bis objection of the control of the	-

Sulphur Cements (key on p. 290)

Sodium Carbonate	Sedium Chlorote
	-
A	
Sodium Chloride	Sedium Cyanide
	4
Sodium Ferricyanida	Sadium Pluoride*
	A 4
•	
	*Corbon filled sulphur commit
Sedim Medical	Sodies Messelver
Sodium Hydroxida	Sadium Hypochlerite
Sedium Nitrate	Sadium Nitrita
1 1	
	4
Sedium Sulphote	Sodium Sulphide
	•
	•
Sodium Sulphine	Stannic Olferida
Sodium Sulphrite	
Sodium Sulphrite	
Sodium Sulphrite	
Sedium Sulphrie	
Sodium Sulphrite	Stannic Otlaride
•	
Sodium Sulphrie	Stennic Otheride
•	Stennic Otheride
•	Stannic Otlaride

(Continued on page 304)

J-C ZENITH PULP PRESSES

100% AUTOMATIC FROM SLURRY SUPPLY TO PRESSED CAKE



J-C Zenith Pulp Presses are becoming increasingly important to industry. Here are just a few of the many successful applications:

PAPER PULP: ultre high density bleaching—de-inking—concentrated block liquer recovery CANNERIES: Juice extractions from pulp—dewatering for by-product recovery

VISCOSE: optimum press ratios in continuously pressing atkall from cellulose

CORN STARCH PLANTS: dewatering garm and

FISH REDUCTION PLANTS: presses cooked whole or weste fish products—maximum water removal and oil recovery

RECLAIMED RUBBER: drier product (15 to 18% moisture), higher quality rubber obtained GLUE PLANT3: maximum grouse recovery and drier final product

Step up profits through improved pressing efficiency. For applications to individual problems, for performance data, write Dept. CE

JACKSON & CHURCH COMPANY, SAGINAW, MICHIGAN



BRONZE?

COPPER

Aluminum?

stainless?

MONEL?

which alloy for your fastenings?

Harber knows because Harper specializes in them ALL... and whether your problem is corrosion, abrasion, heat, stress, appearance or a combination of these, Harper has met it before through many years of service to all industries. Over 7,000 items . . . bolts, screws, nuts, rivets and accessories . . . in stock ready for delivery from warehouses and distributors coast to coast. Mail coupon for new Price List and Stock Book.



HARPER
EVERLASTING FASTENINGS

The H. M. Harper Co., 8206 Lohigh Ave., Morten Greve, III. Rush my capy of new Price Liet and Stock Book.

Name		**********
Address		**********
-	-	

Specialists In ALL non-corrosive metals



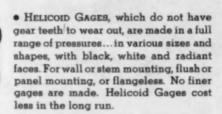
HELICOID

The gage that retains its original accuracy longer, lasts longer, costs less per gage, per year

The greatest achievement of the gage makers' craft—pressure gages without gears. The Helicoid movement...tested and proved in years of hard service... is a simple cam and roller arrangement that gives long, trouble-free service.



- 1. Stainless Steel Helicoid Roller (no gear teeth)
 - 2. Stainless steel hair spring
 - 3. Long Life Cam (no gear teeth)
 - 4. Hardened Monel link and screws





for the Helicoid Gage catalog. HELICOID Pressure Vacuum GAGES

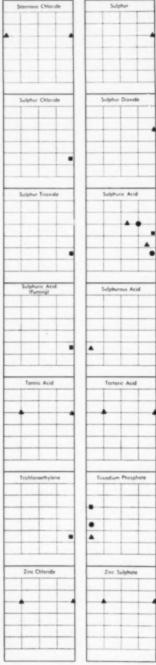


HELICOID GAGE DIVISION
AMERICAN CHAIN & CABLE

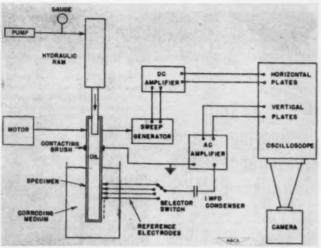
927 Connecticut Avenue · Bridgeport 2, Connecticut

CORROSION FORUM, cont. . .

Sulphur Cements (key on p. 290)



-End



Rotogenerative detection equipment as set up for probing into stress corrosion.

New Way to Detect and Locate Corrosion

Now adapted to stress corrosion, rotogenerative detection may be of value in fields of cathodic protection, inhibitor action, and general corrosion problems.

J. B. McAndrew, W. H. Colner and H. T. Francis

The new method can be used with electrolytes varying widely in conductivity and is applicable to systems whose local cells have rather small physical dimensions. Its principal advantage over the other methods is that corrosion currents can be detected even when the precise location of anodic and cathodic areas is not known beforehand, provided the corrosion currents produce a potential field around the tip of the electrode.

According to previous methods, the surface of a corroding metal may be scanned, using a reference electrode to detect variations in the potential of the electrolyte. Those regions of the electrolyte near cathodic zones of the specimen will be relatively more nega-

tive than those near anodic zones. While this technique is theoretically applicable to any corroding metal, in most cases the magnitude of the potential difference which must be detected is very small compared with the corroding potential of the specimen as a whole. Moreover, the corroding potential of a metal specimen is rarely sufficiently constant for high-precision measurement. Consequently, direct-current scanning of a corroding metal surface (at least in a high-conductivity medium) is difficult if not

On the other hand, if it were possible to separate the small potential drop produced by the corrosion current from the potential of the specimen as a whole, detection of these currents would be greatly simplified.

ROTATING GENERATORS A.C. SIGNAL

Such separation can be accomplished through the use of a rotating cylindrical specimen, scanned by a fixed reference electrode located close to the surface of the corroding metal. This technique in effect generates an alternating-current signal which is a

reproduction of the potential gradients set up in the corrosion medium by the local-action currents—hence the name "rotogenerative." The direct-current potential of the specimen as a whole is readily blocked by a series capacitance, permitting amplification of the alternating-current component to the desired level.

Using this technique, it is not necessary that the corroding potential be constant; a gradual drift of the direct-current potential of the specimen will not be detected by the amplifier system. The alternating-current signal, however, is passed readily by the condenser when rotational speeds of several hundred rpm. are used. Actual speed is 1,725 rpm.

While it has not been attempted thus far to interpret quantitatively the vertical displacement of the oscilloscope traces (representing magnitudes of corrosion currents), it has been found possible with simple patterns to correlate the horizontal displacement with position of local anodes and cathodes. Further investigation should lead to a more complete understanding of the potentialities and limitations of the method.



Now-Full Scale Tests

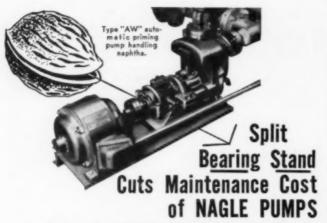
A 4,000-lb. per hr. salt water evaporator is being added to the Harbor Island, N. C., corrosion testing station of the International Nickel Co. Previous testing has been limited to specimens of metals, wood, rope and protective coatings.

Purpose is to study effects of water treatment and design on corrosion and scaling of such units.

Facilities for exposure of specimens to sea spray at Kure Beach, N. C., are being enlarged three-fold. Chemical companies located near salt water have a stake in the work being done at both locations.

It is fortunate for them too that the work of the William F. Clapp Laboratories, Duxbury, Mass., with facilities at Harbor Island, will be continued with no loss of momentum as a result of the death of Mr. Clapp. A. P. Richards, the new president, will con-

J. B. McAndrew, W. H. Colner, and H. T. Francis, of the Armour Research Foundation, Illinois Institute of Technology, developed the rotogenerative detection process. The work was carried out under the sponsorship of the National Advisory Committee of Aeronautics and was part of a fundamental study of the stress corrosion of aircraft alloys.



Just unscrew (or cut off with a torch if necessary) four nuts on each side and the top half of the bearing stand lifts off exposing the bearings. Merely loosen one nut on each side to release tubular supports, for slippage seal adjustment. Instant "thumb & forefinger" packing gland adjustment. Impellers, plates or casings changed in a jiffy. These and other features cut maintenance costs to the bone. That is why Nagle Pumps are preferred for the really tough pumping jobs. Also vertical shaft pumps for pumping abrasive or corrosive materials.





HENSZEY Feed Water METER STANDS UP where others FAIL

The cutting, abrasive action of hot, dirty Boiler Blowdown quickly breaks down meters that depend upon close clearances and intricate parts for their accuracy. Henszey Meters stay accurate—stay on the job—accurately measuring Boiler Blowdown, Feed Water Condensate, FREE - RUNNING CHEMICALS and other "hard-to-measure" liquids. For details consult Sweet's Catalog or write:

HENSZEY CO., DEPT E2, WATERTOWN, WISCONSIN

HENSZEY

FEED WATER METERS

Continuous Blowdown • Distillation Systems • Heat Exchangers
Boiler Feed Regulators • Flow Indicators • Proportioning Valves
also MILK EVAPORATORS and PRE-HEATERS

CORROSION FORUM, cont. . .

tinue furnishing industry with the latest know-how for fighting marine borers attacking their shore installations.

New NACE Head

Mars G. Fontana, professor and chairman, Department of Metallurgy, Ohio State University, Columbus, Ohio, has been elected president of the National Association of Corrosion Engineers. He will be installed during the annual conference and exhibition of the NACE in Galveston, Tex., in March 1952.



Why Moisture-Proof Coatings for Insulation?

Tendency is to apply insulation neglecting moisture penetration more than we should—moisture that has often had a chance to absorb a goodly amount of corrosive vapors.

Outdoors and sometimes indoors a protective film that is impervious to liquids and vapors and resistant to acids and alkalis is needed. (Moisture penetration cuts insulating properties, too.)

Shown above is such a film (black areas) over insulation, before applying a coat of aluminum paint. It is a cold-setting compound of rubber and selected asphaltic hydrocarbons which forms a tough, elastic coating, and is manufactured by the Rubber and Plastics Compound Co. Inc., 30 Rockefeller Plaza, New York 20, N. Y.

Some insulating materials are more absorbent than others, so your need for positive moisture exclusion should be guided accordingly, considering also the severity of local conditions.

More Plastic for Plant Piping

New uses for plastic pipe keep cropping up. An example is the successful use of Tenite (Tennessee Eastman Co.) cellulose acetate butyrate plastic pipe in the oil fields, where its corrosion resistance and light weight make it more desirable than metal pipe. Tests indicate the pipe's suitability for low-pressure water lines, vent lines for inert gases, floor drains, brine circulating systems, acetic acid recovery systems, and certain types of gas installations.

An indication of the pipe's aging qualities can be gained from a recent report on a 10-year old winery installation. Approximately 1,000 ft. of 2-in. diameter pipe has been in continuous use for this period of time carrying vermouth from a winery to a tank building. About 100 ft. of this pipe runs outdoors between buildings. At present, the entire installation shows no deterioration other than a slight yellowing in color, its transparency is still good, and it is still in regular use.

The pipe is currently being extruded for industrial use in 20-ft. lengths and in diameters up to 6 in. Flow of a material can be observed and clogged lines readily spotted because of the transparency. Successive lengths of pipe are connected by couplings fabri-

cated from the plastic.

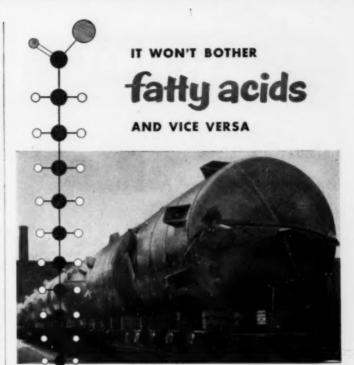
Many miles of plastic pipe have been installed in the oil fields to help check corrosion of sour crude and water repressuring lines. A crew of three men can lav 4,000 ft. of 4-in. pipe in one day. It weighs only about one-twelfth as much as cement-lined steel pipe. Also, this pipe conducts oil without accumulation of paraffin. Its smooth interior wall delivers more liquid than standard steel pipe of the same diameter. It performs equally well in warm or cold climates and is flexible enough to withstand expansion caused by ice formation.

Scratching for High-Temperature Alloys?

The newest of the nickel alloys—Incoloy—was developed to spread available nickel as far as possible, and, at the same time, to produce a useful heat-resistant material in at least as large or larger total amounts than is presently possible with the higher nickel content Inconel.

In the past, International Nickel Co. spent a great deal of time gathering data from laboratory and field study before introducing a new alloy. Because of present emergency conditions, Incoloy is being placed on the market before this preliminary laboratory and field testing is completed. Inco feels, however, that this step is justified not only by the existing situation but by the excellent results of tests so far completed.

A glance at the nominal chemical composition of Incoloy shows that it has approximately half the nickel con-



The use of aluminum equipment in the processing of fats, fatty acids and aldehydes shouldn't surprise you...

Aluminum has the advantage of not promoting oxidation of these sensitive compounds. The use of all-aluminum equipment from overhead condensers through to the storage and distribution of the finished product completely eliminates the problem of dissimilar metals which actually accelerate oxidation.

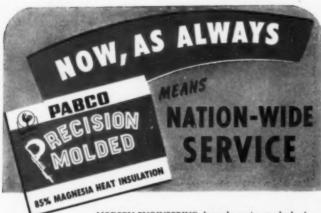
Aluminum does more. More than protect the taste, odor, stability and appearance of these products. It resists corrosion by free fatty acids in oils. It is non-sparking. Aluminum improves temperature control of your processes through its high heat conductivity. It is easy to clean. Easy to machine, weld and handle in the shop. In other words, aluminum fabricates easily. Over competing metals (other corrosion-resistant metals), you save ½ to 5/6 in material costs alone.

Alcoa's development engineers have much experience with vessels, storage tanks, filters, exchangers, pipe and tube of aluminum for fatty acid service. They offer their immediate personal attention to your questions. Write (company letterhead please) to:

ALUMINUM COMPANY OF AMERICA 18628 Gulf Building · Pittsburgh 19, Pa.



ALCOA first in ALUMINUM



MODERN ENGINEERING demands precise standards of heat insulation performance. Pabco's Precision Molded 85% Magnesia combines the time-tested superiority of Magnesia with precision molding to give you a light weight insulation manufactured to very close tolerances.



CAL STOCKS

Pabco Engineering Service Units are strategically located throughout the United States and maintain adequate stocks of Pabco's Precision Molded 85% Magnesia Heat Insulation. Regardless of your location, Pabco Engineering Units give the service and materials you need when you need them.



COMPETENT INSULATION ENGINEERS

Each Pabco Approved Engineering Service Unit is staffed with competent insulation engineers and skilled mechanics. Between each unit and the Pabco factory there is a constant cooperative interchange of experience and methods, resulting in special benefits to every



SERVICE EVERYWHERE

Pabco Engineering Service Units may be found in the classified section of the telephone book, or by writing to the factory. You can depend upon every Pabco Engineering Service Unit for the same high standards of materials, workmanship and methods of application. Get the complete facts on Pabco heat insulation and service now for your future needs.



New York 14 Manufacturers of Heat Insulation Since 1920 Pabca Engineering Service Units in all Principal Cities CORROSION FORUM, cont. . .

tent of Inconel. (Inconel's nickel content: 77 percent):

Nickel Ironremainder

The following indicates how Incoloy compares with an accepted high temperature engineering material, Inconel:

1. Oxidation Resistance. Incoloy

compares favorably with Inconel.

2. Strength and Hardness. Room temperature tests of annealed specimens indicate that the tensile properties and hardness value are approximately the same.

3. Work hardening. Comparable.

4. Machining, forging, cold and hot forming techniques will be about the same for Incolov as those now used for Inconel.

5. High Temperature Properties. Incoloy's structure is stably austenitic and shows no tendency to embrittle with prolonged exposure at intermediate temperatures. And although long time creep and rupture tests have not been completed, early indications are that the high temperature properties of Incoloy will run somewhat higher than those of Type 330 stainless. (But lower than Inconel.)

Smooth Vibrationless PROPELLERS

for MIXING, STIRRING AERATING, PUMPING AGITATION



A Michigan 34" Stainless Steel propeller with split hub for mounting in receptacle through manhole.

Manufactured by an exclusive process, Michigan propellers are perfectly balanced to avoid whip and strain on shafts. They are available for original equipment, replacement or special application in a wide range of materials and in sizes up to 60". Write for latest data folder.

MICHIGAN WHEEL CO. GRAND RAPIDS 3, MICH.

For Maximum
Resistance to

Corrosion Be Sure

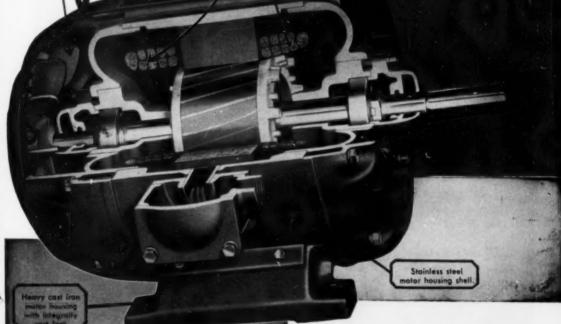
to Specify.



THE LOUIS ALLIS

CHESTOCK STOR

Heavy cast bronze ventilating fan.



This new motor has been specifically designed and constructed to withstand the corrosive conditions encountered in chemical plants, oil refineries, and other similar operating conditions.

For further information contact your nearest LOUIS ALLIS Sales Engineer. "An increasing application of ozone by industry is certain. Resourcefulness and ingenuity are necessary in finding its practical use."

 Murdock, Harold R., Ind. and Eng. Chem., Vol. 43, November, 1951.

Welsbach Ozone Can Help In Solving Your Oxidation

Problem . . .

and increase your profits!

Low-cost, efficient Welsbach Ozone offers industrial users a new teel...a tennage exident at surprisingly low cost—with no full time supervision or labor necessary, with operating costs constant and predictable and maintenance costs negligible!

In installations ranging from chemical processes to treatment of industrial wastes to water purification, it is today's outstanding chemical oxidant.

You can depend on Welsbach Ozone... with a constant flow of all the exone you want, twenty-four hours a day, day-in and day-out. Add to that these extra dividends: no procurement problems, no meterials handling and no storage expense. And no production delays because Welsbach Ozone is generated at the point of use ... it is always available!

Welsbach's years of ozone research opened the door... industry is finding Welsbach Ozone the answer to its oxidation problems. It could be the answer for you!

investigate the potential of



for information, write

THE WELSBACH CORPORATION

VE PROCESSES DIVISION

2409 W. Wastmaraland Street, Philadelphia 29, Pa

loneers in Continuing Ozone Research





Note some of the reasons why

- * Special lightweight pistons minimize wearing pressure on the rings.
- Ease of disassembly facilitates inspection of pistons, rings, cylinder liners and valves.
- ★ On-the-job-replaceable chromeplated cylinder liners for hard, smooth, friction-reducing surfaces, and field replaceable crosshead guides.
- * Carbon graphite compression rings designed to compensate automatically for wear.
- * Patented Dual-Cushion valves, all parts of which are made from corrosion-resistant materials.
- * All wearing areas, except carbon rings, are either chrome-plated, surface hardened, or of stainless steel.
- * Complete line of types and sizes of compressors to meet any capacity and pressure requirements. Let us quote on your air supply needs of any nature.

W80 | 4047

Over 100 Years of Engineering Leadership

JOY MANUFACTURING COMPANY

GENERAL OFFICES: HENRY W. OLIVER BUILDING . PITTSBURGH 22, PA.

IN CANADA: JOY MANUFACTURING COMPANY (CANADA) LIMITED, GALL ONTARIO

You and Your Job Edited by Richard V. Reeves



Photo courtesy Standard Oil Co. (N. J.

BLUEPRINTS for a plant or a future: nothing is accomplished without a plan.

Getting Started in Consulting

As one consultant put it, "the way to get started is to get started." But it isn't as simple as that. Here are pros, cons and a few stumbling blocks to side-step.

Engineers are ambitious. More than a few feel that in five, ten or twenty years, they will have the knowledge, ability and experience to become consultants.

If you've thought of becoming one of these free-lance technical executives, you might want to mull over the advice some of the top members of the profession have generously offered—advice on the money you'll need, the intestinal fortitude you can't be without and the kind of experience you can build upon.

The advice is as varied as the personalities of the men who offer it: some of it is fundamental; some of it is whimsical; most of it is sound.

We asked a group of selected consultants a number of what we considered to be pertinent questions. First we asked how much money a fledgling needs to try his wings. The answers were realistic. "Enough to live on and maintain an office for three years." "Two years normal and comfortable business and domestic budget, including a contingency." "\$25,000." "\$20,000." The estimates varied from about \$5,000 over and above living expenses for six months with definite prospects of work lined up, to \$25,000 plus credit if needed. One respondent pointed out that a man needs staying power rather than any given sum. Estimates of minimum capital needed were a little lower, but not much proving again that getting started in any profession is not easy.

Next we asked about experience. Although the answers indicated that the lower limit was ten years with a good specialized knowledge of one industry or operation, a few consultants thought that in very special cases a man might take the plunge with as little as 5 years behind him.

Then we put the question of technical training to them, with specific questions about graduate degrees, and practical versus theoretical training and experience.

In general the successful consultant thought it was a good idea to have a doctor's degree—but all hastily added that this was not an essential, in fact no graduate degree was an essential requisite. Some consultants actually considered too much "pedagogy" detrimental

One respondent had some entertaining sidelights. He said:

"While degrees do not show how hot' a person is unless they be degrees on a clinical thermometer, the work essential to get degrees is usually beneficial, and in some cases advancement is blocked by the mere lack of a degree. To a certain extent, education has become overrated—but we cannot cut out the hallmark on silver just because it is sometimes put upon baser metal."

Practically all of the consultants emphasized the desirability of a good grounding in the broad and theoretical aspects during a man's training and formative years, fortified with plenty of down-to-earth plant experience—especially trouble shooting.

With regard to gaining experience by changing jobs, opinion was varied. Some authorities said, "yes, change jobs every three to five years or as soon as you can leave as a friend with a clear record of accomplishment." Others said that changes at too-frequent intervals could be very damaging. The crux of this question was a man's particular specialty. If the specialty were isotope application, for instance, a man would usually have no excuse for changing jobs for the sake of experience.

We then asked about personal qualifications.

The consultants thought that one of the main qualifications was the ability to write well, to organize and present data, arguments and conclusions effectively. Following this, but not considered equally important, was the ability to speak well. Good salesmanship and an extrovert personality were noted as helpful, but not necessary, attributes. The man blessed with "horse sense" was the man thrice blessed in the opinion of most consultants.

Besides "horse sense," it was the majority opinion that the successful consultant needs a pretty high degree of "business sense." He needs to run a "tight ship" with regard to his office. If he employs even a part-time secretary, he needs to know about withholding tax, social security and something about accounting—or be able to retain an accountant or hire a book-keeper.

He also needs to know how to protect his personal assets from his professional liabilities by incorporating or carrying adequate insurance.

(Continued)

The editor wishes to thank those consultants who generously contributed the information contained in this article and to hastily add that responsibility for the generalisations and opinions expressed are his alone. Thanks are especially due to the following: Truman B. Wayne; H. L. Shuldener; Jerome Alexander; Roger Williams, Jr.; Benno Lowy; Sam Tour; Johan Bjorksten; Charles O. Brown and Lowers and the consultants were most helpful.



at less cost ... with no investment in equipment

by using
General American
Tank Storage
Terminals



Make no investment. Risk no capital.

Five strategically located terminals can handle any liquid that flows through a pipeline. They provide tanks, pipelines, docks, loading racks, drumming and canning facilities, labor, supervision and administration.

You may enjoy all the privacy and convenience of your own private terminal. General American warehouse receipts represent the highest form of collateral. For financing, storage and distribution suggestions, contact your nearest General American representative.

GENERAL AMERICAN TANK STORAGE TERMINALS

GENERAL AMERICAN TRANSPORTATION CORPORATION • 135 SOUTH LA SALLE STREET • CHICAGO 90, ILLINOIS
TERMINALS; Corteret, N. J.; Houston, Texas; Corpus Christi, Texas; Goodhope, Le.; Chicago, III. • Offices in Principal Cities

for valving corrosive and "hard-to-handle" fluids . . .

HILLS-MCCANNA

offers over 20,000 different "custom-made" assemblies on a standardized basis



32 standard operators

Methods of operation for Hills-McCanna Valves include handwheel and lever operators, sliding stem, air and hydraulic cylinders, diaphragm motors and electric motors in a variety of types.



14 standard diaphragms

Diaphragms, the heart of Hills-McCanna Valves, are offered in the widest choice to best suit your individual needs; 5 types of rubber, 3 of Neoprene plus Hycar, butyl, Tygon, Compar, special polyethylene and Kel-F.



48 standard body materials

Bodies for Hills-McCanna valves are furnished in cast iron, with or without such linings as rubber, glass, lead, etc.; in any machinable alloy or in such materials as Karbate, stoneware, porcelain, etc.



By offering such a broad selection of operators, diaphragms and bodies, Hills-McCanna is able to furnish so many standard combinations that the user is in the position of being able, in most cases, to find the exact valve that best fits his individual requirements. There is virtually never any need to adapt to your service a valve developed for someone else's needs.

The 36 page catalog No. V-52 gives full details on all Hills-McCanna Valves. Write for your copy. HILLS-McCANNA CO., 2341 W. Nelson St., Chicago 18, Illinois.

HILLS-MCCANNA

Saunders patent diaphragm values
Also Manufacturers of Proportioning Pumps
Force Feed Lubricators • Magnesium Alloy Castings

You AND Your Job, cont. . .

With regard to advice for the man who wants to prepare for consulting in the future, the respondents had varied suggestions. "Prepare for the first essential; i.e., an income to assure a livelihood other than dependence upon consultancies." "Read through college course in chemistry and chemical engineering every year to keep fresh in mind those areas which you do not use currently." "Forget it. Be a success in what you are doing now. Move into consulting from a top position." "Learn economics."

A plethora of other advice was offered. A consultant needs to know a great deal about running a business, about financial matters, accounting and the like, both to conduct the affairs of his own establishment and to work effectively with his clients.

Some of the things a consultant should not do: "Don't expect anything from friends or acquaintances until you have shown success." "Don't under any circumstances accept an assignment unless you have at least a 75 percent chance for success."
"Keep overhead low." "Keep free of equipment sales entanglements unless your 'consulting' services are to be these of an equipment or contracting company representative. Stay on one side of the fence, either that of the plant owner who purchases equipment, materials, supplies and contracting services, or else that of the people interested in selling to the former. You cannot serve both, especially at the same time.'

One respondent summed up all the advice this way:

"A consultant by definition is the last man hired and the first man fired. Any young men who dream of the day they'll become consultants should think more seriously of raising oranges or of opening a grocery store.

Another had this to say:

"Consulting is really only a good opportunity for people of exceptional talents, ability to work at super-human rates, and a thick skin. Their specialization should not be so much in a particular phase of knowledge, but a specific type of service of unusual qualification which can go on long after the special knowledge is obsolete. It is a tough business and not easy to break into."

But perhaps the best advice of all was contributed by one consultant who quoted from a song in "Wang," a comic opera of half a century ago:

"The motto is to know your biz.

And when pie is passed by fate
Do not bite off a larger piece
Than you can masticate."

-End



precision engineering that assures peak performance at lowest cost. Check and mail the coupon today for the information that fits your particular problem. Sales offices in THOMAS' REGISTER. Other "Blue Ribbon" Products in CHEMICAL ENGINEER-

ING CATALOG, REFINERY CATALOG, BEST'S

SAFETY DIRECTORY, MINING CATALOGS.





1 to 150 horsepi







MAIL THIS COUPON To Coppus Engineering Corp., 222 Park Avenue, Worcester 2, Mass.

in tanks, tank cars, drums, etc. in underground cable manhiler manhiler in aeropiane fusilages, wings, etc. on cobe ovens. on steam-heated rub- ber processes.	on boiler repair jobs. COOLING: motors, generators, switchboards. wires and sheets. general man cooling. around cracking stills,	exhausting welding fumes. stirring up stagnant air wherever men are working or material is drying. drying of walls, absets; etc., after treated with coating material.	NAME COMPANY ADDRESS CITY
(Write here any special venting problem you may have.	tilat-		

a fair day's work Speed fresh, cool air into a furnace, man-

hole, tank or other confined area where men

must work and you'll get faster, better

There's a portable, easily adaptable

Coppus Blower or Exhauster for just about

any problem caused by stagnant, hot or fume-filled air. The Blue Ribbon stands for

work in return.

DO YOU REALLY KNOW WHAT MULLING IS?

ATCH the practiced technique of a chemist's mortar and pestle-the intensive smearing and rubbing actions-and basically THAT'S MULLING. Nothing compares with it in uniformly blending dry. semi-dry or pasty materials.

That's why Simpson Mix-Mullers have proved superior in the Chemical Process Industries. By combining the chemist's mulling action with large ca-pacity, accuracy, speed and uniformity, Simpson Mix-Mullers are able to meet every production requirement for blending dry, semi-dry or pasty materials. Thousands of installations offer positive proof of superior mixing results.

Mulling with a Simpson Mix-Muller utilizes a special pair of revolving mullers and plows mounted on a stationary pan. The mullers are adjustable and are supported by rocker arms so that they can be free to ride on the material, creating a true mulling action as they revolve. This eliminates all balling of material and quickly develops a maximum plasticity of the mix.

. . . what SIMPSON Mix-Mullers can do for your process . . .

You need only to look at the two photomicrographs below to palize the superiority of mulling in a Simpson Mix-Muller. At ne left is result of using an ordinary paddle type mixer (note mear of unmixed material) — at the right the obviously finer, uniform results of using a Simpson Mix-Muller.









View of laboratory size Simpson Mix-Muller with crib removed to show action of mullers. Note muller

Here is why SIMPSON Mix-Mullers are used throughout the Chemical Process Industries:

- GREATER PRODUCT UNIFORMITY
- FASTER MIXING CYCLE
- LOWER COST PER TON OF MATERIAL
- LESS LABOR REQUIRED
- LESS HORSEPOWER REQUIRED
- SAFER OPERATION

Simpson Mix-Mullers are built in capacities from 1/10 to 30 cu. ft. They may be specially equipped for heating and cooling while mixing—for mulling under vacuum or pressure—for corrosive materials or to function as a reaction vessel

FOR PROOF of the ability of Simpson Mix-Mullers to do a better job in multing your material, our complete laboratory facilities are available without obligation and if your material can't be successfully mulled, we'll tell you why. Write for complete



Mix-Muller® Division

NATIONAL ENGINEERING CO. 604 Machinery Hall Bldg., Chicago 6, III.



The <u>light</u> way to ship is in Continental Fibre Drums



These light-weight durable shipping containers are designed for real economy. They bring you appreciable savings on shipping charges — savings that can amount to substantial sums in the face of today's high freight rates. And they also save you worthwhile amounts on export shipments where import duties are figured on gross weight.

Continental drums are tough and sturdy. They stand up to the abuse of long freight hauls without splitting,

cracking or leaking. This means you can give expensive or dangerous materials adequate shipping protection at minimum shipping cost. Closures seal securely, yet go on and off easily.

These drums can be printed or paint sprayed to become colorful, effective "traveling salesmen!" Continental fibre drums are available in a full line of sizes, from 12 gallons to 75. Call or write your nearest office for complete details.

CONTINENTAL © CAN COMPANY

Fibre Drum Division

NEW YORK

PHILADELPHIA

PITTSBURGH

TONAWANDA

CLEVELAND EAU CLAIRE

CHEMICAL ENGINEERING-February 1952

317

Names in the News Edited by Frances Arne



MAN OF THE MONTH:

Robert B. Wittenberg New manager of the chemical division of General Tire and Rubber in Akron.

Bob Wittenberg's new post with General Tire & Rubber comes after an impressive list of chemical industry connections. Most recently, he has been assistant to the president, industrial division manager and a director at J. T. Baker.

He spent the first years of his career, 1924 to 1932, with Grasselli Chemical Co. He switched to Mathieson Alkali Works where he was manager of market research and development until 1940. Before joining J. T. Baker he was manager of International Minerals & Chemicals potash chemicals department.

His interest in chemistry was probably inherited from his father, Lester Wittenberg, who was executive vice president of the Barrett Co. He vividly remembers his first youthful venture into research. "I put water in a bottle of Bromo-Seltzer and sealed it. It was amazing to see how far the mess exploded. He also has reason to recall a sally into physics involving a nickel inserted in an open electric light socket. Result: pretty sparks and burned hands.

He graduated from Yale's Sheffield Scientific School in 1924, married in 1926. "Mrs. Wittenberg has the patience of a saint. She has to put up with the rest of us." The rest of us includes "three boys and one onery, half-setter, half-springer dog. Mr. Potts, who bosses the house." Mr. Wittenberg dubs his three sons, in chronological order, his Number One, Two, and Three Boys. For official purposes only, their names are Bob Ir., Lester and Frederick.

He lists his hobbies as: chemical economics, golf (very poor), trout fishing. His interest in chemical economics is reflected by the fact that he is one of the founders of the Chemical Market Research Assn. He's also a charter member of the Commercial Chemical Development Assn.

- Paul L. Johnstone. Director of development, synthetics department, Hercules Powder Co. Formerly manager of the synthetics market development division. Joined Hercules in 1940 as a chemist. Chemical engineering graduate of Princeton.
- Chalmer G. Kirkbride. From vice president and director to president of Houdry Process Corp. Joined the company in 1947 as manager of research and development. Previously, professor of chemical engineering at Texas A & M.
- Lyle W. Rothenberger. General superintendent of the Klamath Falls, Orc., pilot plant of Hercules Powder Co. Has been plant superintendent and chief chemist at the plant since 1950. Joined Hercules in 1937. Purdue graduate.
- P. Frank Hagerty. Assistant professor, department of chemical engineering. University of Pennsylvania. Studied at MIT and Yale. Employed for two years at Eastman Kodak.
- Randolph T. Major. Chairman, research and development board committee on chemical warfare. Vice president and scientific director, Merck & Co. Joined Merck in 1930 as director of pure research.
- Finley C. Nicholson. Manager of operations, Davison Chemical Corp. With the company since 1942, most recently as manager of its Cincinnati catalyst plant. Purdue graduate.

John D. Kramer. With the Dixie Research Division of Commercial Solvents at its Sterlington, La., plant. Has been with Ford, Bacon & Davis Construction Co. at Sterlington. Chemical engineering graduate at Louisiana Polytechnic Institute.

Jack G. Copeland, Jr. Works manager of Hercules Powder Co.'s plant at Carthage, Mo. Since 1947, assisant works manager of the company's dynamite, ammonia and acid plant at Hercules, Calif. Joined Hercules Powder in 1936 as an analytical chemist.

Carleton B. Edwards. President, Reilly Tar and Chemical Corp. and Republic Creosoting Co. Company history: research chemist, director of research, production manager. general manager of the companies.

J. T. Sheehy. Executive vice president, Rayonier, Inc. Has been manager of the Grays Harbor Division at Hoquiam, Wash. Joined a predecessor company in 1933.

R. J. Kunz. From chief engineer, special products division, to director of production and engineering, Borden Co. With company since 1945. Formerly, director, chemical engineering development, Hoffman-La Roche.

Fred R. Conklin. Works manager, Tennessee Eastman. Formerly, general superintendent, plant operations. With the company since 1931. Studied at Oregon State and Yale.



F. C. Nicholson

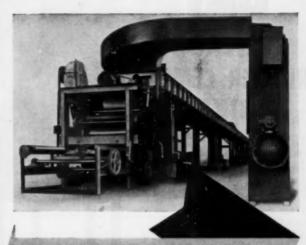


F. L. Miller

Floyd L. Miller. Vice chairman of the research and development board, Department of Defense. Director of the research division, Standard Oil Development. Joined Standard in 1929 as a research chemist.



HOW CAN SANDVIK'S NEW COOLING CONVEYOR Improve YOUR production?



This Sandvik Patented Water-Bed conveyor handles gelatin from liquid form to solid cut strips, ready for drying. Result: Eliminates many manual operations . . . makes floor space available.

HOW THE WATER-BED CONVEYOR OPERATES — The loaded, onepiece steel band "floats" along on an open trough of circulating water. The water pressure assures 100% coolant contact with the belt. The trough is so designed that no water can get on top of the belt. After cooling, the delicate film is deposited on a take-off conveyor at whatever point gravity separates it from the underside of the main steel belt.

HOW TO "PRE-TEST" THE WATER-BED CONVE OR WITH YOUR OWN PRODUCT — Sandvik has available, portable experimental units on which you can make small scale trials of your own product, in your own plant. You will see for yourself the cooling capacity of this conveyor and how it can open new processing possibilities.

Experimental water-bed units are available on request. Sandvik's engineering department will be glad to provide technical advice and belp. Write, wire or phone for complete details.

SANDVIK STEEL, INC.

Conveyor Division

111 Eighth Ave., New York 11, N. Y.
Watkins 9-7180

Manufacturers of Steel-Belt Conveyors For Over 30 Years



Finer Shearing for Faster Vissolving

HERO
RUBBER CEMENT
MIXER

No ordinary equipment can match a DAY Hero Rubber Cement Mixer for fast, thorough dissolving. The reason is posttive shearing action.

Four sets of stationary blades, 90 degrees apart, extend downward from the top frame. Two other sets, 180 degrees apart, extend upward and rotate with the vertical shaft. Close tolerance between stationary and rotating blades assures rapid reduction of particle size and greater exposure to solvent action.

For heavy-duty operation demanding speed and efficiency, put a DAY Hero Rubber Cement Mixer on your production line. Available in 80, 150 and 300 gallon capacity.





Here is a close-up view of the unique blade design for finer shearing and faster mixing.

1147 HARRISON AVE., CINCINNATI, OHIO



Standard of the Chemical industry for mixing signing dispossion equipment

THE J. H. DAY COMPANY, CINCINNATI 22, OHIO

NAMES IN THE NEWS, CORT. . .

Doctorate from the University of Michigan.

Clayton F. Ruebensaal. From technical director, plastics and resins, to commercial development manager, U. S. Rubber's Naugatuck Chemical division. One of the organizers of Glenn L. Martin Co.; largely responsible for initial research, development and production of Marvinol polyvinyl chloride resins. Joined Naugatuck in 1949. His successor as division technical director: D. Lorin Schoene, formerly manager of organic research. Joined the company in 1939 as a chemist.





C. F. Ruebensaal

H. B. Coats

H. B. Coats. Director of the new research and development department of the chemical plants division, Blaw-Knox. Has been a member of the company's research staff since 1943. Previously with Leslie Laboratories and Upjohn Co. Doctorate in chemical engineering from the University of Michigan.

Arthur Langmeier. Assistant general manager, naval stores department, Hercules Powder Co.; formerly director of operations. His successor:

A. H. Reu, manager of the department's Georgia operations. Mr. Langmeier joined Hercules after graduation from the University of Missouri in 1918; Mr. Reu, after graduation from the University of Minnesota in 1920.

J. H. Bruun. Head of the new commercial development department of the General Aniline Works Division, General Aniline & Film. Formerly director of research, central research laboratories. Joined GAF in 1942

William Blum. Retiring as chief of the electrodeposition section of the National Bureau of Standards after 42 years service. Winner of the Acheson Medal of the Electrochemical Society in 1944. Doctorate in chemistry from the University of Pennsylvania. His successor: Abner Brenner. With the bureau since 1930. Studied at the uni-



the Philosopher's Stone

In the Middle Ages the alchemists sought to make—with the aid of Sulphur—a wondrous thing called the "philosopher's stone". With this "stone", they planned to work miracles of many kinds. They hoped, by touching it to base metals, to convert those metals into precious gold.

Although the alchemists' dreams for Sulphur were never realized, Sulphur adds to mankind's natural wealth through its role in fertilizer. It enhances the earth's riches by helping to convert



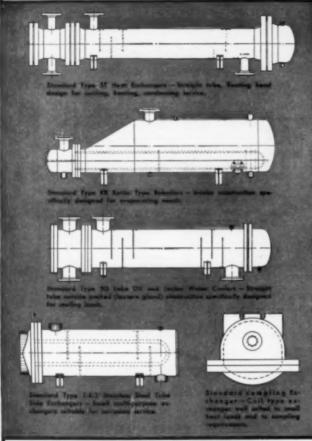
air and soil constituents into growing plants. Sulphur is used not only in the form of sulphuric acid for the manufacture of most fertilizers but also as an ingredient in many of them to correct soil deficiencies. Thus, through increased yield from our agricultural lands, Sulphur makes another basic contribution to supplying the world's necessities.

FREEPORT SULPHUR COMPANY, oldest U. S. producer of crude Sulphur, has been supplying this essential raw material for over 35 years.

FREEPORT SULPHUR COMPANY

OFFICES: 122 East 42nd Street, New York 17, N. Y. . MINES: Port Sulphur, Louisiana . Freeport, Texas

"Standard" for Economy



"Special" for Efficiency

Standardized Whitlock Heat Exchangers give you a big return on your money. When you pick a standard design, you profit by (1) lower first cost, (2) quicker delivery, (3) better service, and (4) ready availability of spare parts. May we help you select the right Standard Whitlock Heat Exchanger for your own special needs? Write for data and recommendations. The Whitlock Manufacturing Co., South St., Hartford 10, Conn.

WHITLOCK

DESIGNS use BUILDS Bends - Colls / Conformery - Confors - Neer Euchampers

NAMES IN THE NEWS, CONT. . .

versities of Missouri, Wisconsin and Maryland.

Charles E. Reed. General manager of the newly formed silicone products department, GE's chemical division. Other positions since joining the division in 1942: manager of the chemical engineering section, engineering manager of the division. Previously assistant professor of chemical engineering at MIT. Studied at Case and MIT.





W. Hirschkind

R. G. Heitz

William Hirschkind. Technical advisor to Dow's president. Has been research director of the company's Western Division since 1939. Previously with Great Western Electro-Chemical Co. His successor as research director: Robert G. Heitz, formerly assistant to the research director. With Dow since 1936. CIT graduate.

John G. Dean. Chemical research consultant with headquarters at Tuckahoe, N. Y. Formerly in charge of the industrial chemicals section, development and research division, International Nickel.

Sam Robinson. In charge of Gulf Chemical Co.'s plant at Galena Park, Tex. Formerly chemical engineer with Phillips Chemical.

John M. Kamenar. Area supervisor, Monsanto's Texas City plant. Joined the company last year as a chemical engineer in the process engineering group.

Richard O. Bender. Assistant technical manager, petroleum chemicals division, Du Pont. Came to the company in 1941 as head of the chemical division petroleum laboratory; prior to his most recent position as assistant technical manager he was working on new product development. From 1931 to 1941, with Sinclair Refining.

Byron T. Shaw. Administrator of the Department of Agriculture's agricultural research administration. Has been deputy administrator for over three years. He succeeds P. V. Cardon who retires after a career of 42 years as researcher, teacher and administrator.

David S. Bruce. Manager of new product production for the cellulose products department of Hercules Powder Co. For the past four years, assistant plant manager at the cellulose products plant at Parlin, N. J. Joined Hercules in 1936.

Philip T. Sharples. Member of the board of directors, Pennsylvania Salt Mfg. Co. Chairman of the board and former president of the Sharples Corp. and Sharples Chemicals; president of Sharples Oil Co. Chemistry graduate of Swarthmore.

Norman C. Weil. Director of technical service, alkali section, Solvay Process Division, Allied Chem. & Dye. Formerly manager of the chlorine and water supply group in the technical service department. Graduate of Rensselaer Polytech.

E. W. Volkmann. Associate director, research department, Koppers Co. Associated with Koppers research department since 1940. With the company and a predecessor since 1926. Doctorate in chemical engineering from Columbia.

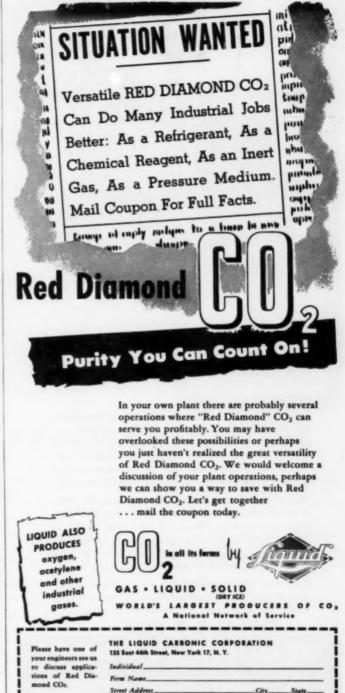
John J. Hickerson. Research chemical engineer in the chemistry and chemical engineering research department, Armour Research Foundation. Formerly, development engineer, U. S. Radium Corp. Chemical engineering graduate of the University of Missouri.

Earle E. Langeland. Vice president, American Maize-Products Co. Since 1949, plant manager of the company's Hammond, Ind., works. Since joining the company in 1940: assistant plant superintendent, assistant plant manager, plant manager. Studied chemical engineering at MIT.

Henry W. Johnstone and Blythe M. Reynolds. Newly-elected directors of Merck's Canadian subsidiary. Mr. Johnstone: senior vice president and director of the parent company. Mr. Reynolds: vice president for engineering and purchasing.

Paul Mayfield. From assistant general manager to general manager of Hercules' naval stores department. Joined the company in 1925 as a chemist. Graduate of Indiana University.

Justus B. Stevens. Vice president and





of this Duraspun High Alloy Casting is that four different sizes of centrifugal castings are involved. These vary from 34" to 3½" in diameter. Sections, outlets, collar bands, lugs etc., were all welded together in our shop to form the retort as you see it in the picture. Assembled weight runs around 7,464 pounds.

High alloy castings is our business—not merely the adjunct of an extensive steel founding business. We have the experience—30 years in the static casting division and 20 years on centrifugal castings. We pioneered both kinds for castings in this country. And we have excellent testing and checking facilities, including a 400,000 volt X-ray machine and gamma-ray units.

If you would like this combination of wide experience, modern shop practice, up-to-date equipment and full testing facilities working on your next high alloy casting, bring it to us.

THE DURALUY COMPANY Offices and Plant Scottlade, Pa - Rassura Offices: 12 East 41 st Street New York 17, N. Y. IN THE WO PARLETON FOR STREET NEW YORK 17, N. Y. MITTHE SCOTTLAND TO RELEASE THE STREET NEW YORK 17, N. Y. MITTHE SCOTTLAND TO RELEASE THE STREET NEW YORK 17, N. Y. MITTHE SCOTTLAND TO RELEASE THE STREET NEW YORK 18, N. Y. MITTHE SCOTTLAND TO RESERVE THE STREET NEW YORK 18, N. Y. MITTHE SCOTTLAND TO RESERVE THE STREET NEW YORK 18, N. Y. MITTHE SCOTTLAND TO RESERVE THE STREET NEW YORK 18, N. Y. MITTHE SCOTTLAND TO RESERVE THE STREET NEW YORK 18, N. Y. MITTHE SCOTTLAND TO RESERVE THE STREET NEW YORK 18, N. Y. MITTHE SCOTTLAND TO RESERVE THE STREET NEW YORK 18, N. Y. MITTHE SCOTTLAND TO RESERVE THE STREET NEW YORK 18, N. Y. MITTHE SCOTTLAND TO RESERVE THE STREET NEW YORK 18, N. Y. MITTHE SCOTTLAND TO RESERVE THE STREET NEW YORK 18, N. Y. MITTHE SCOTTLAND TO RESERVE THE STREET NEW YORK 18, N. Y. MITTHE SCOTTLAND TO RESERVE THE STREET NEW YORK 18, N. Y. MITTHE SCOTTLAND THE STREET NEW YORK 18, N. Y. M

NAMES IN THE NEWS, CONT. . .

chief engineer, Sealol Corp. With the company for 11 years. Brown graduate.

J. H. Moczek. Senior technologist, process section, Monsanto's general engineering department. Monsanto history: joined in 1946 as a senior chemical engineer, general development department; project engineer, process section, engineering department; project engineer, development group. Formerly, process engineer with the Barrett Division Allied Chem. & Dye. Studied at the universities of Wisconsin and Michigan.

Hans Beller. From manager of the special products and sulphur colorstextile auxiliaries areas to technical director of the new fields department. With General Aniline since 1941. Previously with Chemnyco, chemical industry consultants. New production manager at the company's Grasselli plant: A. O. Zoss, heretofore superintendent of special. His successor: Clyde McKinley, formerly chemical engineering assistant to Dr. Beller. New supervising chemical engineer in the special products area at the plant: Charles F. Montross.

Emil Ott. Recipient of the first Honor Scroll of the Pennsylvania chapter, American Institute of Chemists. Director of research, Hercules Powder Co.

Maston Nixon. President, Southern Minerals Corp. and Southern Pipe Line Corp. Chairman of the board, Pittsburgh Plate Glass and its subsidiary, Columbia-Southern Chemical Co.

Robert T. Baldwin. Executive secretary and assistant treasurer, Assn. of Consulting Chemists and Chemical Engineers. New director of publicity and assistant executive secretary: A. B. Bowers.

Lowell L. Fellinger. Assistant director of engineering. Monsanto's organic chemicals division. Has been the division's coordinator of technical personnel procurement. Became a research chemist with the division in 1941, then: pilot plant group leader, divisional assistant director of research. Graduate of Washington University.

Henry H. Russell. Development engineer, Pittsburgh staff of the national research agency of the bituminous coal industry. Formerly a



These 3 Cooper-Bessemer IM motor-driven comsors retain

ducing plants.

If you wonder where the unusual economy comes in, the answer is quite simple. Because these JM's are exceptionally compact, without sacrificing accessibility or ruggedness, they conserve costly space, require less investment in foundations, piping

pressors are busy saving dollars month in, month

out in one of the nation's biggest ammonia pro-

Moreover, it's demonstrated time and again that these modern, compact Cooper-Bessemer compres-

and over-all installation requirements.

sors retain the long life qualities of the much bigger slow speed units. Naturally this adds up to low upkeep cost on any long range basis you care to name.

If your plans call for motor-powered compressor service, up to 3000 hp, let us give you some interesting facts on the Cooper-Bessemer features ready to save you money year in, year out.

New York Washington, D. C. Bradford, Pa. San Francisco Houston, Dallas Greggton, Pampa and Odesse, Texas Seattle Tulsa Shreveport St. Louis Los Angeles Chicago Caracas, Venezuela Cooper-Bessemer of Canada, Itd., Halifan, Nava Scotia Gloucester, Mass. Colmes Engineering Co., New Orleans, La.

The Cooper-Bessemer Corporation

MOUNT VERNON, OHIO - GROVE CITY, PENNA.



ALLOY TYPE FA-20*

Norman S. Mott Chief Chemist and Metallurgist

Although FA-20* was originally developed for use in hot sulphuric acid solutions, its high resistance in various media, as well as its superior physical properties, has increased its popularity to the point where it is presently being supplied by our foundry for valves, pump units, pipe fittings, and a variety of cast shapes used in the chemical, textile, paper, plastic and food industries.

FA-20 offers superior resistance, as compared with 18-8-SMO, in hot strong solutions of calcium or magnesium chlorides and aluminum sulphate; in dilute solutions of tin, zinc, iron or mercury chlorides at room and slightly elevated temperatures; and in cold dilute solutions of sodium or calcium hypochlorite. It is also superior in sulphur dioxide solutions or sprays, in dry chlorine gas at ordinary temperatures, wet hydrogen sulphide gas, boiling sodium or potassium hydroxide solutions of over 30% concentration, acid sludges up to 200°F., and in hot vinegar and salt solutions.

In sulphuric acid its use is required when the concentration is over 40% at room temperature, 10% at 175°F. or 0.75% at boiling; and it is satisfactory in all concentrations of this acid at temperatures up to 175°F., and up to 40% of concentration at boiling. It is recommended for boiling phosphoric acid when the concentration exceeds 10%, and for hydrofluoric acid of less than 10% or over 60% strength at room temperatures, although fair service may be had at all concentrations.

FA-20 is not recommended for use with wet chlorine gas or other wet halogens; chloroacetic acid; hot strong solutions of copper, iron or mercury chlorides; or with molten sodium or potassium hydroxides. It is satisfactory for service in nitric acid solutions, but for this use it offers no superiority over 18-8 type alloy and does not justify the additional cost.

Maximum properties at lowest cost are achieved when the alloy is cast to the following specifications:

Carbon
Chromium20.00%
Nickel29,00%
Copper 4.00%
Molybdenum 3.50%
Silicon 1.00%
Manganese 1.00%
Tensile Strength75,000 psi
Yield Point45,000 psi
Elongation 2" 40%
Reduction in Area 45%
Brinell

The nickel content offers good resistance to sulphuric acid corrosion and maintains the copper in alloy solution, minimizing the possibility of its becoming a contaminant in corrosion. Chromium provides resistance to nitric acid and other oxidizing media, and together with the nickel supplies the excellent mechanical properties of the alloy. Molybdenum and copper provide for increased sulphuric acid corrosion resistance and the molybdenum also increases passivity and reduces the tendency to pitting. The low percentage of carbon is essential for resistance to intergranular corrosion attack. Silicon and maganese are incidental to the production of the alloy, and in the amounts present provide little influence on mechanical or corrosion resisting properties.

Copies of this article reprinted on leavy stock for convenient filing are available on request.



process engineer, chemical plants division, Blaw Knox Construction Co. Chemistry graduate of Penn State.

- A. T. McPherson. Associate director of the National Bureau of Standards. Formerly chief of the bureau's organic and fibrous materials division. Came to the bureau in 1918. Chief of the rubber section, 1930 to 1943.
- Cecil Morgan. From vice president to director of Esso Standard Oil. Joined Esso's Shreveport, La., office in 1936. His successor: H. J. Voorhies who continues as general manager of the Baton Rouge refinery. Came to Esso in 1929 as chemical engineer, then: head of the refinery process engineering department, head of the technical division, assistant to the general manager, assistant general manager.
- B. M. Van Cleve. Vice president, Sherwin-Williams. Continues as director of the company's pigment, chemical and color division.
- L. Eugene Greenwell. Project engineer, engineering department, Monsanto's organic chemicals division. Has been operating supervisor at the company's William G. Krummrich plant at Monsanto, III. Chemical engineering graduate of Columbia. Donald Wasson and Leon W. Davis: chemical engineer and assistant engineer, respectively, in the department's process section.
- William L. Campbell. Deputy administrator of DPA for production, chairman of DPA's production exexcutive committee. Vice president of Food Machinery and Chemical Corp.
- R. M. Burns. Chemical coordinator, Bell Telephone Laboratories. Continues as director of chemical and metallurgical research.
- Daniel B. Curll, Jr. Chemical specialist with Lee Higginson Corp., New York. Previous employers: Du Pont; Philadelphia Quartz, Rumford Chemical Works and, most recently, Commercial Solvents. Graduate of Williams College.
- Herman W. Zabel. Director of research and development of Chemical Enterprises, Inc., New York, recently-organized management-investment group. With Chemical Industries and its successor, Chemical Week, for the past seven years



The COOPER ALLOY Foundry Co., Hillside, N.J.

"Advertisement

o Produced under Durimet patents.

as associate editor. Previously associated with Kansas State College, General Aniline & Film, Du Pont.

- Edward J. LeBeau. Quality control supervisor, phenolic products plant, GE's chemical division. Joined the company in 1947. Chemical engineering graduate of Rensselaer Polytech.
- G. L. Glespen. Chief of the chemicals and packaging branch of PAD's materials division. On one-year leave as technical supervisor of American Cyanamid's petroleum chemicals department.





G. L. Glespen

J. R. Hoover

- John R. Hoover. From sales vice president to president of B. F. Goodrich Chemical. Joined Goodrich in 1925 as a chemist. Harvard graduate.
- Mars G. Fontana. President of the National Association of Corrosion Engineers. Professor and chairman, department of metallurgy, Ohio
- Harold C. Harsh. Production manager of Ansco, Binghamton, N. Y., a division of General Aniline & Film. In charge of Ansco's film, paper and chemical plants. Has been manager of the quality con-trol department. From 1946 to 1949, manager of the chemical development department.
- George W. Collins. From assistant manager to manager, E. I. du Pont de Nemours' plant at Du Pont, Wash. Joined the firm in 1914 becoming chief chemist of the Louviers, Colo., plant the following year. Made powder superintendent at Dupont plant in 1936. Tufts graduate.
- R. Wolcott Hooker. President, Compressed Gas Assn. Vice president in charge of sales, Hooker Electro-chemical Co. Also elected president of the Chlorine Institute for the fourth successive year.
- Arthur J. Hill. Honorary member, American Institute of Chemists. Professor emeritus and former head



saran lined steel pipe today. Mail this coupon to the Saran Lined Pipe Company is manufactured by The Dow Chemical Co. for full information. Saran lined steel

Saran Lined Pipe Company

2415 BURDETTE AVE. • FERNDALE, MICHIGAN
With Offices In: New York • Boston • Philidelephile
Philaburgh • Chicago • Tulsa • Portheral • Indianapolis
Sen Francisco • Mourton • Denver • Seemile • Los
Angeles • Clerveland • Charleston, S. C. • Torosto

SARAN LINED FIFE Dow

product



NAMES IN THE NEWS, cont. . .

of the department of chemistry, Yale. With the university since 1913.

Frederic A. Soderberg. Chairman, chemical marketing subdivision, ACS. Manager, industrial division, General Dyestuff Corp. Prior to joining General Dyestuff in 1928, chemical engineer for the Continental Paper and Bag Corp.

Donald B. Keyes. Special consultant to Arthur D. Little, Inc. Continues as a member of the board of directors, Heyden Chemical. Previously: director of research and development for U. S. Industrial Alcohol and U. S. Industrial Chemical Cos.; head of the chemical engineering division of the University of Illinois; vice president of Heyden.

Marshall Stittig. Technical writer, information division of the Detroit research laboratories of Ethyl Corp. Formerly with the engineering division, Chrysler Corp. Chemical engineering graduate of Purdue. New literature researcher at the laboratories: Patricia Lynn Brown.

John D. Fennelbresque. Vice president in charge of the chemical division, Celanese; formerly general manager.

Ernest M. Loveland. Vice president in charge of production, Seaplant Chemical Corp. With Seaplant as general superintendent since 1948. Previously had plant and production management experience with Carbide and Carbon, National Southern Products, S. B. Penick.

E. M. Converse. Retired senior vice president of Dearborn Chemical. With company since 1902. Made vice president in 1934, senior vice president in 1949.

Chris C. Schulze. Assistant manager, process development department, Grasselli Works, General Aniline & Film. Engaged in research for the National Defense Research Committee before joining the company in 1942. Studied at Nebraska State College, State University of Iowa.

Henry C. Rosenberg. New member of the research staff, Dearborn Chemical Co., Ltd., Toronto. Formerly with Standard Chemical Co.

Winthrop Sargent, Jr. New member of the board of directors, National Lead Co., New York. Has been general manager of its Titanium Alloy Mfg. Division since 1948.

Robert S. Sibley. Project engineer in the recently-formed engineering department of Monsanto's organic chemicals division. With Monsanto since 1942. Other appointments in the new department: Donald N. Miller, chemical engineer; John A. Mullendore, assistant engineer.

James H. Gardner. Associated with the petrochemical research department, National Research Corp., Cambridge, Mass. Formerly a technologist for Shell Oil Co., Deer Park, Tex., and a lecturer in the chemical engineering department at the University of Houston. Doctorate from Harvard.

Orville O. Kenworthy. Assistant director of research, central research division, Ferro Corp., Cleveland. Continues as director of chemical research. With Ferro since 1946. Formerly with B. F. Drakenfeld & Co. Graduate of Oklahoma A & M.



O. O. Kenworthy

G. R. Monkhouse

G. R. Monkhouse. Vice president, western division, Shell Chemical. A 30-yr. man in Shell companies, he has been general manager of the western division since 1948.

S. A. Montgomery. Member of the board of directors, Standard Oil Co. (Indiana). Continues as assistant general manager, manufacturing department. Joined Standard in 1919 as a chemist. Studied at Mississippi State and Harvard.

Robert A. Cooley. New member of the staff of the explosives department, Western Cartridge Co., East Alton, Ill. Formerly taught physical chemistry and chemical engineering of jet propulsion at the University of Missouri School of Mines. Howard L. Wolsted: new member of the department's dynamite group. Formerly production supervisor at Monsanto's John F. Queeny plant.

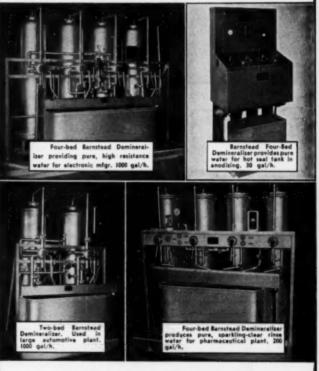
Clinton B. McKeown. Technical superintendent of the aeronautical products division of B. F. Goodrich

BARNSTEAD DEMINERALIZERS PROVIDE LOW-COST PURE WATER

for . Electroplating . Anodizing

- Photographic Solutions
- Salt-free Rinse Water Silvering

And Hundreds of Other Applications



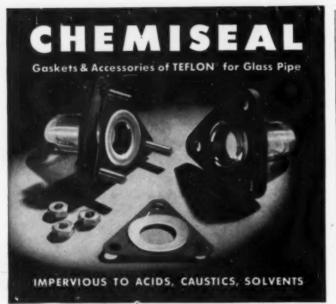
Selection of the best size and type of demineralizer for your operation depends on the nature of your raw water supply, flow rate needed, daily demand, and degree of purity required. Send a sample of your water to our Laboratory and Barnstead Engineers will perform the necessary analysis without obligation.

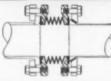
PROMPT DELIVERIES

WRITE FOR FREE CATALOS



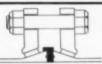
4 Lanesville Terrace, Forest Hills, Boston 31, Moss



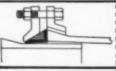


(Abore:) Chemiseal Jacketed Gaskets, Types T6N or T6-300 are standard for Corning conical flanges, seal at unusually low bolt load.

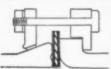
(At left:) Chemiseal Expansion Joints, No. 212 for use where thermal expansion, vibration or misalignment requires a flexible pipe section. Sizes from 1 in. to 12 in. I.P.S.



Chemiseal Snap-on type 820 Gaskets. Molded to match contour of conical-end glass pipe, they assure perfect, automatic centering of joints and free flow of materials. Made for all standard pipe sizes from 1/4 in. to 6 in.



Chemiseal Jacketed Slip-Joint Gaskets (Teflon Jacketed Neoprene) provide positive, chemicalproof seals with low bolt loads. Made for standard pipe sizes from 1 in. to 6 in.



Chemiseal Adaptors No. 2-CRS, provide a tight, safe seal between glass coated steel or similar nozzles with large inside radii, and vessels of glass-lined steel, porcelain, Haveg, etc. A steel bearing ring provides rigidity. Resilient core assures perfect seal. The Teflon Jacket prevents chemical attack and contamination.

**da Pauf: trademark for its thraflamenthylene resin.

UNITED STATES GASKET COMPANY

PRODUCTS DIVISION

628 N. 10TH STREET, CAMDEN, N.J.

FOREMOST FABRICATORS OF "TEFLON" AND OTHER PLUOROCARBON PLASTICS NAMES IN THE NEWS, CORT. . .

Co. With the company 15 years. Has been manager of the raw materials inspection and development department since 1950. Chemistry graduate of the University of Illinois.

Frank N. Kemmer. Chemical engineer, ion exchange department, National Aluminate Corp., Chicago. Formerly, manager of chemical research, Cochrane Corp. Lehigh graduate.

Kenneth C. Towe. President, American Cyanamid. Has been a director since 1939. Joined the company in 1926.

OBITUARIES

Russell I. Baker, 59, plant manager of the Grasselli Works Division, General Aniline & Film, died December 11. He had been with the company 31 years.

L. S. Gregory, 48, president of the consulting engineering firm of L. S. Gregory Co., died in Tulsa, Okla, December 16. Some previous employers: Phillips Petroleum; Black, Sivalls and Bryson.

Jacob H. Wright, 75, plant manager and one of the founders of Sunland Sulfur Co., died in Fresno, Calif., December 26. He began work with Niagara Chemical Co. and with Cornell University scientists was the first in the U.S. to grind sulphur under inert gas.

Harry P. Banks, 68, prominent in the Pacific Northwest's chemical industry, died in Phoenix, Ariz., December 28. He was president of I. F. Laucks Co., Seattle, when the firm was purchased by Monsanto in 1944. He retired from the firm in 1949.

Peter C. Reilly, 82, founder and president of Reilly Tar & Chemical Corp., died in Indianapolis January 4.

F. E. Jacquot, 61, who had managed the Du Pont, Wash., plant of E. I. du Pont de Nemours since 1948, died January 9. He joined the company in 1915.

Raymond C. Gaugler, president of American Cyanamid Co., died January 11.

Joseph A. Pellettere, 50, chemical engineer for Gulf Oil, died in Pittsburgh, Pa., January 14. NOW-ALKALINITY AND HARDNESS REMOVED BY ION EXCHANGE WITHOUT USING ACID

The New Permutit DUAL BED ION EXCHANGER

Hew kind of ION EXCHANGE UNIT has many advantages

SIMPLER EQUIPMENT

Because it combines anion and cotion exchange in a new way, the Dual Bed Ion Exchanger needs only a single tank and regenerant.

PLAIN SALT REGENERATION

being regenerated with plain salt, the new resins eliminate need for handling such dangerous chemicals as caustic soda, sulphuric acid and hydrochloric acid.

"SAFE" WATER YIELD

Water from the new unit is "safe" because it cannot produce an acid water during the operating cycle, or acid waste during regeneration.

T's another Permutit first: a completely new kind of ion exchange unit for producing, at lower cost, water of a quality suitable for low pressure boilers, or for other uses not affected by sodium salts. The new Permutit Dual Bed Ion Exchanger combines both anion and cation exchange resins in the same compact unit, each type in its own separate bed. This eliminates the need for much elaborate equipment.

The Dual Bed Ion Exchanger employs new type resins that are regenerated with plain salt. For further details, write to The Permutit Company, Dept. CE2, 330 West 42nd Street, New York 36, N. Y., or to Permutit Company of Canada Ltd., 6975 Jeanne Mance Street, Montreal.



ION EXCHANGE HEADQUARTERS FOR OVER 38 YEARS

INDUSTRIAL NOTES

- Lummus Co., designing engineers and constructors for the petrolum and chemical industries, has moved its Houston branch organization to 2707 Wesleyan Rd.
- Blaw-Knox has moved the fats and oils departments of its chemical plants division from Pittsburgh to Chicago. The new location is at 180 North Wabash St.
- Celanese Corp.'s chemical division has moved its Chicago offices to 101 East Ontario St.
- Centric Clutch Co. has moved to a newly erected plant in Woodbridge,

NEW COMPANIES

- Pacific Coast Plywood Assn., Seattle, a newly organized cooperative, to build a \$1.5 million plywood mill near Freshwater, Calif.
- Dow Chemical Inter-American Ltd. and Dow Chemical International Ltd. to extend Dow's international activities. The former will handle the parent company's business affairs in Mexico, Central and South America and the West Indies, while the latter will perform similar functions in Europe, Asia, Africa and Australia.
- Chlorophyll, Inc., to extract and market chlorophyll, xanthophyll, carotene, phytol and related products and develop extractions of other chemicals from agricultural sources. The plant will be in Neodesha, Kan.
- De Laval Turbine Pacific Co., San Francisco, to handle West Coast business of the parent company, De Laval Steam Turbine Co.
- Gordon Chemical Co., Wilmington, Del., to manufacture urea formaldehyde molding compounds and allied chemical products.

NEW LINES

National Starch Products, New York-Copolymers in water emulsion tailored to meet needs of individual users. The company continues to make the copolymers in solvent solution.

- NEW LOCATIONS Sherwin-Williams Co., Cleveland-An improved type of zinc chromate primer for aluminum aircraft parts. An exclusive license for manufacture and distribution has been granted the company by Northrop Aircraft, Inc., Hawthorne, Calif.
 - Augusta Chemical Co., Augusta, Ga.-Materials, known as Rapidogens, to print colors on textiles. The com-pany already produces Napthols used in production of paint pigments, printing ink and lacquer

NEW REPRESENTATIVES

- Emulsol Corp., Chicago manufacturer of surface active agents, has appointed industrial Chemical Co., Issaquah, Wash., as its technical sales representative in Washington and Oregon.
- Mission Mfg. Co. has appointed D. D. Foster Co., Pittsburgh, Pa., as distributor for its line of centrifugal
- Zurn Services, Erie, Pa., has appointed John B. Foley Co. as representatives for the sale of Zurn Industrial Division products which include pipe line strainers. Foley's territory will be eastern New York State.
- Gas Purifying Materials Co., Long Island City, N. Y., has appointed Millmaster Chemical Corp., New York, as sales agents for chemical iron.
- Hanna Engineering Works, Chicago, has appointed the power-transmission products division of Portland Iron Works, Portland, Ore., as distributor for its pneumatic and hydraulic cylinders and valves in the state of Oregon and parts of California and Washington.
- B. F. Goodrich Chemical Co. has appointed Polymer Industries, Astoria, N. Y., to handle New England distribution of Good-rite TS-20, a new processing size for nylon.
- Baker Castor Oil Co. has appointed Thompson-Hayward Chemical Co., Minneapolis, as its exclusive sales agent in Minnesota.
- Denver Equipment Co. has appointed Road Machinery Supply Co., Duluth, as its exclusive distributor in

- northern Wisconsin and Minnesota. Charter, Inc., Ishpeming, Mich., has been appointed to cover the upper peninsula region of Michigan. The Denver company makes such items as jaw crushers, vibrating screens, classifiers, agitators.
- Metals Disintegrating Co., Elizabeth, N. J., has appointed two new distributors for its metal pigments, powders and abrasives: J. W. Copps in Milwaukee; Daniel G. Hereley Co., Chicago.
- B. F. Goodrich Chemical Co. has appointed Polymer Southern, Inc., Greenville, S. C., as distributors for the southeastern states of a new processing size for nylon.
- Vegetable Oil Products Co.'s Vopcolene Division has appointed three new agents. B. E. Dougherty Co., San Francisco, will serve as na-tional sales distributor for Vopcolene products to the rubber industry.

 Lotte Chemical and Dye Corp.

 of Paterson, N. J., will handle East Coast representation. Pacific Northwest sales will be served by W. Ronald Benson, Inc., Seattle.

NEW FACILITIES

- M. H. Treadwell Co., New York-An electrochemical construction division to design and construct plants, installations and equipment for the chemical and other process industries. Chlorine plants by the mer-cury cell process will be the divi-sion's specialty.
- Calabama Chemical Co.-A \$500,000 plant for basic agricultural chemcals at McIntosh, Ala. It adjoins the new chlorine-caustic plant of Mathieson Chemical Co. from which it will get supplies.
- Norwich Pharmacal Co.-A unit for the manufacture of 240,000 lb. a year of nitrofurazone crystals.
- American Potash & Chemical Corp.-A plant to process crude lithium salts recovered from the brine of Searles Lake at the company's plant at Trona, Calif., so they can be sold as lithium carbonate.
- R. T. Collier Corp.-Doubled calcine coke kiln capacity and a new 3,000 sq. ft. research laboratory at its Santa Clara, Calif., location. The



Pasted and sewn valve and open mouth



3. KRAFT

NO MISSING LINKS IN YOUR CHAIN OF SUPPLY





ly integrated mill

You can be sure of delivery when you order from Hudson. That's because the company is its own supplier. An unbroken chain runs from forest to finished product to you. 427,000 acres of Hudson-owned timber assure a steady source of raw material. Pulp operations, kraft-making, and bag manufacture all take place in one, modern integrated mill. Order as much as you want with confidence.

Output will be stepped up whenever needed. For example, 60,000 extra tons of kraft paper are now being produced and provide expansion of multi-wall sack facilities. Your orders can be delivered promptly.

The sacks are always strong and uniform, built to your exact specifications. Order from Hudson and get what you want...when you want it!

HUDSON PULP AND PAPER CORPORATION

SILICATE SERVICE FOR CHEMICAL BUYERS

PQ triple feature

Convenient plants

Convenient deliveries from nine manufacturing plants located in Anderson, Ind.; Baltimore, Md.; Buffalo, N.Y.; Chester, Pa.; Jeffersonville, Ind.; Kansas City, Kansas; Rahway, N.J.; St. Louis, Mo.; Utico, III.

Full line of silicates

Mere are over 40 silicates—silicates of soda, sodium metasilicate, sodium sesquisilicate, potassium silicates. Ask for Bul. 17-1 describing all PQ products & their uses as adhesives, binders, sizes, gels, detergents, colloids, rust inhibitors, coagulating & deflocculating aids, & protective films.

Long experience

Silicates have been manufactured by us since 1860. PQ's Chemical Department can offer suggestions that will save you valuable time and money.





PQ Silicates of Soda

METSO DETERGENTS

This buffetin available by a request on your letterhead.

PHILADELPHIA QUARTZ CO. 1125 Public Ledger Building, Philadelphia 6, Pa.

Versatile Top Entering Eastern Mixer Versatile! Series C Vertical Mixers do big mixing jobs quickly and thoroughly. Their power range is from 1/4 to 15 H.P. at standard speeds of 1725, 1140, 420, and 280 R.P.M. Standard NEMA ballbearing type motor is furnished. Stuffing box is separate component and can be specified in any alloy for low original cost. Write our engineers about your mixing problem. Their service is without obligation, Sand now for new Eastern Mixer Catalog No. 600 Write for new Eastern Mixer Catalog No. 600

Eastern INDUSTRIES, Inc.

INDUSTRIAL NOTES, COUT. . .

Los Angeles company makes petroleum coke for aluminum producers and charcoal from peach and apricot pits for gas mask filters.



Sterling Electric Motors, Inc., Los Angeles—A \$2 million plant in Van Wert, Ohio, for production of gears, splines and gear boxes. E. O. Danielson is in charge.

Koppers Co.—Laboratories in Verona, Pa., where a major portion of the company's research will be centered. Extension pilot plant work will be made possible by the new facilities.

International Minerals & Chemical Corp., Chicago—An industrial minerals division created as a result of absorbing Eastern Clay Products, Inc.

National Starch Products Inc.—A \$2 million program to expand its resin activities. The first step in the 3-yr. program will double present capacity for producing vinyl acetate polymers and copolymers.

Falk Corp., Milwaukee—A Denver sales office managed by Herman H. Klackner.

Allied Chemical & Dye Corp.'s Solvay Process Division—A \$15 million mercury cell chlorine-caustic soda plant at Moundsville, W. Va. It will be completed within two years.

Askania Regulator Co., Chicago—A branch office in Philadelphia headed by Robert J. Kroth.

Commercial Solvents Corp.—Additional ammonia and methanol production units at Sterlington, La. To cost \$20 million, the expansion will double production, will be completed early in 1953.

Koppers Co.—A completely integrated tar processing plant in Fontana, Calif., to produce coal tar chemicals, creosote, roofing pitch and various other tar products. To be completed by 1952, it will get its tar from the chemical-recovery coke ovens of Kaiser Steel Co. which adjoins it.

Leeds & Northrup Co., Philadelphia-

A sales and service office in Atlanta, Ga.

J. M. Huber Corp.—A plant in Havre de Grace, Md., to produce chemicals and pigments.

General Electric Co.—A 50 percent increase in production capacity at its silicone plant in Waterford, N. Y. The \$5 million expansion should be finished by the end of 1952.

Pacific Northwest Alloys—A Mead magnesium plant near Spokane, Wash. Built by the government during the war at a cost of \$16 million, the plant has been licensed to the company and undergone a \$2.5 million renovation program.

J. T. Baker Chemical Co.'s Taylor Chemical Division at Penn Yan, N. Y.—Carbon disulphide manufacturing facilities completed at a cost of \$500,000.

Long-Bell Lumber Co., Kansas City, Mo.—A plywood plant at Gardiner, Ore. The plant, with a monthly capacity of 4,500,000 sq. ft., will be operated under the name of Gardiner Lumber Co., a Long-Bell subsidiary.

Pittsburgh Plate Glass Co.—A plant at Shelbyville, Ind., for its new fiber glass division. Production will commence by early fall.

Metal Hydrides, Inc., Beverly, Mass.— A \$25,000 expansion of its facilities for production of lithium aluminum hydride, lithium borohydride, sodium hydride and sodium borohydride.

Nopco Chemical Co.—A unit for volume production of choline chloride at its Cedartown, Ga., plant.

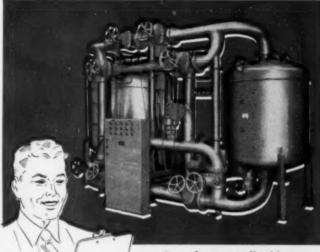
Allied Chemical & Dye Corp.'s Solvay Process Division—An organic section to develop and manufacture a line of organic chemicals and related products. The first project of the new section will be a \$5 million ethylene glycol and ethylene oxide plant to be completed within two years.

Eutectic Welding Alloys Corp.—A new wing on its Flushing, N. Y., plant to house two new research laboratories.

Armstrong Cork Co., Lancaster, Pa.—
A separate felt and fibrous products department of its industrial division to provide specialized sales and development service.

—End

There's a KEMP DRYER for every Moisture Problem



Dry air, gases, liquids to sub-zero dew points . . . at minimum cost

Quality, diversity, flexibility, economy . . . four good reasons why Kemp Dynamic Dryers offer you the best solution for any moisture problem. Kemp superiority of design and engineering know-how is your assurance of dependable, low-cost performance whether you dry air, gases or liquids. Many Kemp users report drying to sub-zero dew points for as little as \$\frac{1}{2}\$ per mcf—including all charges for labor, capital investment and materials. In addition, Kemp guarantoes operation of every unit to meet your specifications.

Kemp Engineering Versatile

Gas, electric or steam regeneration is standard equipment with every Kemp Dynamic Dryer . . . with or without cooling units. Also, depending on your needs, you have a choice of manual, semi-automatic or fully automatic operation. In every instance, Kemp will specify the proper dessiccant suitable for your operation. Chances are there is a standard Kemp design that is ideal for your plant and saves you money too. It costs you nothing to investigate.

KEMP

3 AVAILABLE*

ORIAD Dries air used to actuate tools, valves, instruments, etc., where drying requirements

RADIATION COOLED For small or medium flow rates. Offer low

operating cost with maximum

CONVECTION COOLED Pro-

of air and gases at minimum

*All of above in complete range of sixes with manual, semi-automatic or fully automatic operation.

are moderate.

efficiency.

cost.

DYNAMIC DRYERS

For technical information and facts on how Kemp Dryers can solve your moisture problems, write for Bulletin D-27 to:

THE C. M. KEMP MFG. CO. 405 E. Oliver St., Baltimore 2, Md.



Look...no hands!



When radioactivity or high temperature makes materials too "hot" for human hands to handle, Greer "mechanical hands" permit an operator to remain many feet away for complete protection.

Functioning with almost unbelievable dexterity, these versatile devices can pinpoint an object on any working area, move it up, down, sideways, can even pour liquids from container to container. This is Greer's answer to the problem of remote handling of "hot" materials,

Many less dramatic but equally important materials-handling problems have been solved — or are being solved — by Greer research and development engineers. With many years of work in the field, these men offer you specialized knowledge and abilities which are difficult to find elsewhere. If you are concerned with any phase of materials handling, you are invited to bring your problems to Greer. Here you will find creative engineering at its best — the kind that is accustomed to meeting and solving the "impossible". An inquiry on your company letterhead will receive prompt attention.



GREER HYDRAULICS INC. - 454 EIGHTEENTH STREET - BROOKLYN 15, NEW YORK



PRESSURES

Scrawed 150 lbs. Steam

Flunged 125 lbs. Steam 175 lbs. O.W.G

225 lbs. O.W.G. Bronze Mounted or All Iron-Sizes 1," to 3"

TROUBLE IS RULED OUT! Check these 16 advanced features-for wearresistance . . . for ease of maintenance. From handwheel to diaphragm, notice how thoroughly trouble has been ruled out in designing this U-bolt valve. No other valve in its class measures up to Jenkins U-bolt Gate on all these points, many of them exclusive.

You can take it apart and put it together again in two minutes, and it's a cinch to clean. When operating threads become worn, just slip in a new "Bonnet Saver Bushing" and restore it to new-valve efficiency. It's a favorite for those plumbing-heating,

mine, mill or any services where excessive sediment is tough on valves and where freezing is a hazard.

For "renewability" without waste, bull-necked endurance, and low upkeep cost, you can't beat Jenkins U-bolt Valves. Yet they cost no more! Full details and specifications in new circular, Form 179-B. Jenkins Bros., 100 Park Avenue, New York 17. Jenkins Bros. Ltd., Montreal.

Sold through leading Industrial Distributors



1. Perfect-Grip Handwheel 2. Valve Index Plate 3. Secure Wheel Nut

5. Large Packing Nut 6. Self-centering Packing Gland 7. Deep Stuffing Box 8. Heavy Duty Bonnet

10. Body-Bonnet Safety Joint

13. Branze Seat Rings, Expanded in 14. Full Length Pipe Threads 15. Liberal Diaphragm Clearance

12. Heavy-Duty Body

16. Strong U-Bolt

4. Heavy Manganese Bronze Spindle

9. Unique Renewable Bonnet-Saver Bushing

11. Extra-Wide Gauge Reversible Branzo Wedge







Quotes, Extracts and Digests Educa by A. S. O'Brien, Sr.

- 1. MATERIALS: "Don't forget Hitler gave the chemical industry in Germany the green light 10 to 12 years before he declared war."
- 2. MANPOWER: "We must face the fact . . . 'ane man is just as good as another' is incorrect in our present situation."
- 3. FINANCE: "I believe the industry will continue to grow, if we can get the capital, but I don't know where the money is coming from."
- EXECUTIVE DEVELOPMENT: "Experience shows that for every replacement there are six to eight other replacements required due to resignations, promotions and expansions."
- 5. PRICES: "I would like to know what the doctor is going to take out of me when I get on the operating table."
- 6. DEFENSE: ". . . you can't make anything in a sulphuric acid plant except sulphuric acid."
- LABOR: "It takes time to establish good relations but the time required is much less than is needed to settle a continuous flow of arievances."
- 8. PUBLIC RELATIONS: "In no industry have companies done a better job in handling their individual problems... But until now they have given little attention to their common problems."

This Year's 8 Big Problems

Threats of war and peace have created some hot problems in the chemical industry—and some unique solutions. During the year you may expect a lot of dust to fly.

Some unusual problems face the chemical industry this year. What are they? What plans are being made to solve them? What do these plans mean?

During its Winter Conference at New York's Waldorf-Astoria, the Manufacturing Chemists' Association could not help but tip its hand. Front office men from 23 leading chemical companies, top government officials from the NPA, OPS, NRC and Selective Service, and four Harvard professors had a lot to say in five key speeches and nine panel sessions.

In the improvised conference rooms of the hotel's Palm Room, Starlight Roof, Blue Room, Jansen Salon and fourth floor suites they took part in 41 short papers and off-the-cuff talks followed by question and answer periods.

Most came with a lot on their minds—some things they could not get off. From the flood of talk during the 12-hour day the silt of eight problems appeared. Bothering most were the materials scarcity, the technical manpower shortage, the financial problem, current need for executive talent, the price and wage control puzzle, the question of public relations, the difficulties of organizing for defense, and the uncertainty of labor relations in the coming year.

The problems obviously are formidable, and not a set-up solution in the bunch. However, many offered answers. Estimates, plans and covenants—besides many a hot argument were made. Ultimately everyone, from the chemical laborer to the plant superintendent, will feel the force of action before the year is out.

1. Material Shortages Could Stunt Chemical Growth. "Don't forget Hitler gave the chemical industry in Germany the green light some 10 to 12 years before he declared war. As a result new chemicals—particularly synthetics—enabled him to fight against odds for many years—even after all his imports were cut off. The chemical industry is a vital part of our economy. It is larger than steel, larger than aluminum, and now represents about 20 percent of our national product."

Monsanto's Felix Williams had more to say but the point was well taken. The chemical industry is solidly planted in our economy, and it wants the means to grow. And recent allocations and priority rulings could be harmful to a growth diet. But to get the materials it wants, industry will have to convince the government it needs them.

Everyone is gathered around the grab bag of searce materials. Receiving particular attention at this moment is sulphur. So far the process industries have had little luck. Administrator Henry H. Fowler of the NPA told questioning chemical men that defense requirements come first. And by defense requirements he means the military, AEC, aviation gasoline, rubber and steel, and some drugs. Obviously the immediate and

less complicated demands have first

But the alarm is sounding. By the end of the year, sulphur will still be scarce. Fowler claims at best he hopes to strike a balance in sulphur supplies. Nothing added to the stockpiles; nothing taken. And new allocations cutting sulphur to 90 percent of 1950's consumption and the limit of a 25-day inventory hit hard. Williams' oratory, and other like his, may become louder and more frequent.

As to other shortages, many chemical men want to know if the government has its figures straight. The lesson of the automobile survey comes to mind: Demand was exaggerated because many prospective buyers registered for a car in more than one agency. Some officials feel similar duplication has taken place in other surveys.

Another complaint: It is easier to get big pieces of stainless steel parts than small ones. Result is plenty of tanks but no parts. But Fowler said he would try to correct this situation. Industry will probably stay on his back.

Strangely the problem of material shortages has placed the chemical industry in working agreement with the government. And it looks like this year with so much at stake, industry intends to become more than a silent partner.

2. Technical Manpower: A Political Question. "We must face the fact—the trite political phrase that one man is just as good as another' is incorrect in our present situation."

Someone had to say it, and Frank Greenwall, president of National Starch Products, did. It was the logical conclusion to the argument of conserving technical manpower in the time of a possible total war. This year the problem, chemical men feel,

LEVER BROS. produces C. P. Glycerol

without distillation...by ILLCO-WAY ion change

ILLCO-WAY De-ionizing eliminates step of distillation normally used...gives 99% yield of C. P. glycerol as compared to a 66% yield by distillation

Purification of crude glycerol — by ILLCO-WAY ionXchange — has proved to be both effective and economical. Cost of producing 1 lb. of 95% C. P. glycerol (starting with a sweetwater containing 15% glycerol and 0.4% ionized solids) is 0.45 cents. In addition, the de-ionized glycerol has considerably better shelf-life than the distilled product.

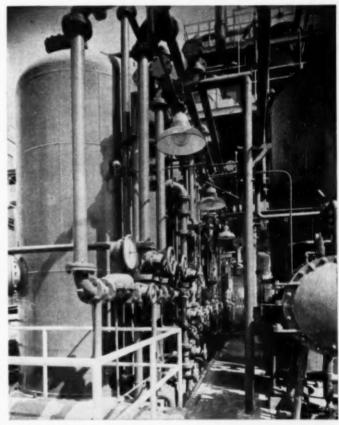
This is another illustration of the versatility of ILLCO-WAY ionXchange. Long a pioneer in the field of deionization, particularly in the treatment of water, ILLCO-WAY, through chemical and engineering research, has applied developments of ionXchange to a wide variety of products and manufacturing processes, including:

Chromic Acid Anodizing Beverages Boiler Feed Water Breweries Chemicals: Heavy, Fine, CP China Condensers Cosmetics Distilleries Drinking Water Drugs Electronics Electroplating Explosives Food Products Formaldehyde Glass Products Laboratories Laundries Molasses

Mirrors

Paper Products Penicillin Perfumes Pharmaceuticals Photographic Supplies Plating Porcelain Enameling Pottery Radio Tubes Rayon Research Televison Tubes Sugar Bearing Solutions Whiskies Tartaric Acid Methanol Milk Products Industrial Waste Recovery of Metals from Waste

We will welcome from you or your production staff any inquiry concerning liquid purification problems which may involve ionXchange.



ILLCO-WAY ionXchange equipment for purification of soap lye crude, installed at Lever Bros. Co. modern new plant in Los Angeles. This unit replaces distillation equipment in the manufacture of C. P. glycerol.



ILLINOIS WATER TREATMENT CO., 844-2 Cedar St., Rockford, Illinois • 141 East 44th Street, New York City
Canadian Distributor: Pumps & Softeners Ltd., London, Ontario

IN WIRE-MESH PRODUCTS LET JELLIFF DO IT!

For 70 years we've been weaving Wire Mesh. And a good part of that time we have also been making things of Wire Mesh for people who find it is cheaper, easier and generally more satisfactory to "let Jelliff do it."

From big Dipping Baskets to tiny precision filters—from fuel strainers to what-is-it gadgets—JELLIFF's Custom Production Department turns out fabricated Wire-Mesh products at speed, price and precision that mean lower customers.

If you buy or make wire-mesh assemblies as components of your own products and have not yet had an estimate from Jelliff, write today for details. No obligation, even if you enclose a blueprint for us to figure on. Address Department 15.



96 Years' Experience in

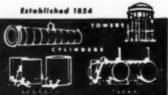
TANK DESIGN

• For almost a century Cole elevated tanks have provided a dependable water supply for mills and communities. Cole quality is assured by careful, experienced designing and watchful supervision from blueprint to finished tank. Send us your inquiries for tanks from 5,000 to 2,000,000 gallons—stating capacity, height to bottom, and location. Write for latest Cole catalog—"Tank Talk."



R.D. COLE

NEWNAN, GA.



QED, cont. . .

has its long and short range aspects. Unfortunately others seem unaware of a problem at all.

To the contrary the Russians, who are turning out 50,000 engineers and another 50,000 technical men a year, have no myopia. Meanwhile our production line bogs down: Last year 42,000 engineers received their bachelors degrees; in 1954, 12,400 are expected.

Today undergraduates want stability, and they find it in other than technical courses. Medicine and ROTC, for example, are two sought after courses. ROTC graduates usually serve for at least two years after graduation. And along with draft calls, the military takes about half of all engineering graduates. The long race is on; we fade as Russia burns up the track.

The immediate problem looks just as grim as the demands of the armed forces continue to mount. This year the call for draftees and reservists (some 35,000 before March) will be particularly heavy.

Draft boards, even if they want to, cannot help. They have quotas to meet and a law to obey. Result this year will be harder deferment. "You must take into consideration that you cannot have a complete exemption for these men, to retain them in your employ indefinitely," Col. Candler Cobb, New York City director of Selective Service, told inquiring chemical officials.

To get action, the chemical industry must enter some strange forests. Although the draft boards offer little help, Monsanto's Robert F. McCoole feels a more intelligent approach, which would include more oral reports and more facts to back up deferment requests, would bring better results. But the real answer lies in public appeal and a lot of persuasion in Washington.

Repealing the draft laws or creating separate laws for technical men will be a tough bet. For politicos, any kind of favoritism is a "hot potato." Public sentiment is more in line with "the one man is as good as another" school. One reason why Moderator Ralph A. Connor, vice president of Rohm & Haas, will call for a bigger public relations program, and another reason to expect a more active chemical lobby this year.

3. Finances Dwindling. "After sober reflection, I have some serious doubts about the further rapid growth of the chemical industry in the next five years. . . I believe the industry will continue to grow, if we can get the capital, but I don't know where the money is coming from."





Heavy duty for crushing and grinding rock phosphate, gypsum, limestone, shale, bauxies, asbestos rock and other chemical and fibrous materials to small sizes in one operation.

Many sizes to choose from and capacity is unusually high and power involved and maintenance extremely low.



WILLIAMS ROLLER MILLS WITH AIR SEPARATION

Many materials are now economically pulverized with the Williams Roller Mill. Finenesses quickly changeable from 40 mesh to 400 mesh and materials may be dried and ground simultaneously.

Remarkable records are being made on insecticide mixes, pigments and dry colors and barytes, phosphate, limestone, etc.



WILLIAMS HELIX-SEAL HAMMERMILLS

Dustless fine grinding, 200 to 325 mesh, without the use of fans, cyclones or separators. Will also grind wet and sticky materials. Easy to install and inexpensive to operate. Variable speed control on feeder permits grinding of different kinds of materials.

WILLIAMS TESTING ... MEANS **GUARANTEED PERFORMANCE**

Submit your grinding problems to Williams. A sample of the material and description of the desired result will set our facilities to work on a solution to your problem. Visits during test runs and technical consultations are invited.

WILLIAMS PATENT CRUSHER & PULVERIZER CO.

2706 N. Ninth St.

MANUFACTURER OF HAMMERMILLS OLDEST AND LARGEST

CHEMICAL ENGINEERING—February 1952

P





Pur CESCO shields right before the eyes of your workers! They're right for safety—stardily constructed with correct designing for repelling harmful objects. Right for comfort—with adjustable headgears formed to the contour of the head. And there's the right shield for every job in the wide range of styles and materials from which to choose.

Send TODAY

for CESCO literature and the name of your CESCO sofety equipment distributor



CHICAGO EYE SHIELD COMPANY . 2342 Worren Bivd. . Chicago 12, III.

CESCO FOR SAFETY

OFFICES IN: Atlanta, Birmingham, Baston, Buffola, Cincinnati, Cleveland, Columbus, Detroit, Bast Orange Hauston, Kansoo City, Knaxville, Little Bock, Los Angeles, Heastoo City, D. F., Milveskee, Montreel, Philadelphin, Ph

WRITE FOR

Hassall decimal-equivalent wall chart

In such popular demand (we've given away 50,000)—we've made it better. The new chart is far easier to read! In three colors to automatically signal decimal-

equivalents of fractions. The special products which frame the chart are a constant reminder of a good source for cold-headed parts.

JOHN HASSALL, INC.

144 CLAY STREET . BROOKLYN 22, N. Y.





DECIMAL EQUIVALENTS

QED, cont. . .

Besides veep Felix N. Williams of Monsanto, many others paused for sober reflection. Since the outbreak of the Korean war, the chemical industry has expanded at an accelerated rate. On top of an already rapid growth following World War II, industrial chemicals have grown—taking the period 1935 to 1940 as 100—to a 455 index in 1950. Planned expansion of heavy chemicals when completed will make capacity 30 percent higher in 1953 than the beginning of 1951. But financial bigwigs seriously doubt a continuation at this pace.

There are several reasons why:

The chemical companies are no longer financially self sufficient. At one time they were able to finance their own growth through carnings retained in business. Now accelerated growth and increased taxation have compelled companies to seek capital elsewhere: offering of rights to their stockholders, generally underwritten through investment bankers; through the sale of securities directly to the public through investment bankers; or through private placement.

Of the 18 leading chemical companies only five had depreciation and retained earnings for the year 1950 in excess of their estimates for plant expenditures in 1951. And this is without the cash needed for working capital expansion. In the future retained earnings will surely be squeezed by much higher taxes and increased

• In 1940 depreciation charges just about matched the then current cost of replacement. According to the National Industrial Conference Board, present depreciating charges fall short of today's replacement costs by about 4-5 billion dollars a year.

 Provisions, through tax amortization, have been made for expansion of basic chemicals. But no such provision is made for chemicals needed for the new replacement market. Expansion in these areas will require billions. And no one knows where the money can be had.

All is not gloom, however. But a new outlook (based on new advances), financial expert Beardsley Ruml told the super session on the Starlight Roof, will have to set in. In the past six years advances, comparable to those in the physical sciences, have been made in finance and economics.

During World War II our national debt rose from \$45 billion to \$275 billion. Despite forecasts that we would have to choose between guns and butter, our standard of living in 1944 was at least as high as in 1941. In addition we produced some \$80 billion worth of armament. We learned a deficit in the federal budget is not inflationary, Ruml said.

A new outlook calls for a fluid financial system. The new school, represented by Treasurer Carl A. Gerstacker of Dow, sees much hope in a capital structure with some leverage. Specifically:

• Relatively low cash dividends supplemented perhaps by yearly stock dividends.

• Regular vearly sales of small amounts of common to the present

· A substantial amount of longterm debt with low sinking fund requirements.

The year may bring a new awakening to a new technology. "Finance, like everything else, is not static. It must change with the times. And business conditions have changed markedly in a generation," said Gerstacker in summing up.

4. Executive Development: A Must. The sink or swim method-for years management has relied upon this method for producing its managers.

But it cannot today. Postwar business expansion has emphasized the increasing complexity of manage-rial responsibility. The new executive must have a working knowledge, not only of his particular duties, but of such new responsibilities as labor relations, public relations and most certainly government.

Today conservation of manpower has become as important as conservation of material resources. Formerly executive development programs readied executives primarily to replace retiring officials. But not now. "Experience shows that for every replacement there are six to eight other replacements required due to resignations, promotions and expansions," Thomas Nelson of Executive Training, Inc., told panel members.

Obviously more systematic cedures for development are due this year. Since the new executive must be a jack of all trades, today's prospects-the trend indicates-will get experience in a number of fields rather than complete specialization in any one field. Studies on the methods and viewpoints of government will be increased.

Many chemical companies, particularly the larger ones, are planning to determine needs for the future. They are making inventories of key personnel, tentative replacement tables, appraisals of executive abilities of incumbents and nominees. Such action as changes in jobs, travel, formal schooling, and special assignments to fill in the gaps of experience are a few things that point to systematic ex-(Continued) ecutive development.



Stuck without WARNING

Who's stuck?

Safety valves that weren't safe? The plant which installed them?

None of this was necessary. If you want 100% safety-and you'd hardly want less-there's one sure way to get it-specify BalanSeal or FarriSeal Valves.

Why?

tions.

Because they can't stick, plug or corrode. Critical working parts are permanently isolated from any contact whatever with the lading.

Because they're unaffected by back pressures in the discharge manifold due to its own operation or to the opening of other valves in the line. Because these features make it possible for you to

use smaller discharge piping, an economy which is often substantially more than valve cost. You'll be interested in the engineering of BalanSeal and FarriSeal Valves-design which is rapidly gain-

ing acceptance in hundreds of successful installa-Ask for our "8-Minute Brief."

Your Safety's REAL With FarriSeal

COMMERCIAL AVE., PALISADES PARK, N. J.



Investigate the Advantages of H & K PERFORATIONS

—for cleaning, grading, straining and filtering . . . guarding and ventilating . . . acoustical treatment . . . ornamental enclosure, and related problems of product and machine design.

You have a wide selection of patterns to choose from, all accurately perforated.

For commercial processing, perforations may be had with as close as ±.0005". Materials include practically all metals and sheet materials such as plastics, fabrikoids, plywood, etc.

Ornamental grilles — modern and classical patterns — are perforated in any currently available metal — finely finished.

Perforated sheets may be furnished rolled, formed, sheared, welded, brazed or otherwise fabricated to your specifications.

Harrington & King

5677 Fillmore Street, Chicago 44, Illinois

Catalog No. 62 falls the "hole" story —write for it!

WATER

For Process, Boiler Feed & Other Needs



*COSTS LESS, OPERATES FOR ONLY PENNIES

Whether your requirements for dependable, high-purity water are 10 or 10,000 gpb, there is a Penfield "Planned Purity" System waiting to make important savings for you in both original equipment and operating costs. Write today for new catalog showing all Penfield water-treating equipment.

THE LOW COST*

MONO-BED WAY

Operating on the most efficient deionizing technique known (intimately mixed cation and anion resins in a single unit tank), raw water passes through a Penfield Mono-Bed Demineralizer only once, yet comes out with resistances reported as high as 20,000,000 ohms. No heat or steam power is ever required, and regeneration of the resins is accomplished by simple gravity and displacement methods.

RUBBER-LINED, SARAN-LINED & NICKEL TANKS

Specially fabricated to suit your individual requirements by Penfield's Tank Fabricating and Lining Division. Write today for complete details.

PENFIELD MANUFACTURING CO., INC. 19 High School Ave. Meriden, Conn.

FILTERS

Penfield "Planned Purity" PAYS!

DECASIFIERS IEMINERALIZERS QED, cont. . .

5. Prices too Complicated. many instances the complication arises out of requests from industry itself. You could state a regulation in simple terms. Say for example that the ceiling price of a belt is one dollar. That is the most simple regulation you can think of. But a man can come in and say, well, I assume you mean belts that you wear not belts that you use in industry. So then we would have to define the belts to mean belts that you wear. It gets little more complicated. Another man comes in and will say, I assume you mean belts you wear to hold up your trousers and not surgical or medical belts. Well, we define it again. And another man can say, well, I assume you mean just belts made out of leather and not made out of silk or something. For one dollar we can't afford to sell a silk belt. You define it again."

Counselor Alfred Letzler from the chemicals and drugs division of the Office of Price Stabilization was not making excuses, but merely illustrating the painful logic behind the endlessly complicated price regulations.

lessly complicated price regulations.
Chemical men feel—and this is their big complaint—price regulations are "unduly complicated." They would rather have the older General Ceiling Price Regulation rather than the recent Ceiling Price Regulation 22.

In CPR 22, which allows a producer to take some pre-Korean price and add increases in cost, there are six different ways to compute your ceiling price. There are also eight sections where OPS decides the ceiling

Industry is against any regulation that gives broad discretion to a government agency. Specifically for them the big headache is Section 38 which allows OPS to revise ceiling prices downward to bring them in line with

other ceiling prices.

Chemical men object to the lack of guide posts under this section. "I would like to know what the doctor is going to take out of me when I get on the operating table. I would like to know whether it is my tonsils or appendix or what is coming out. And I say under 38 you don't know what is coming out." Charles Maddock of Hercules Powder's legal department complained.

OPS has to carry the ball. There is some feeling among chemical men that it faces an almost impossible task in attempting to be fair and equal in an overly complicated field. This is an inevitable result of control from without rather than from within. The belt story should grow before the year ends. (Continued)

PRODUCT CONTROL THROUGH INFRARED ANALYSIS

Number 5 of a Series of Data Sheets for Better Process Control from The Perkin-Elmer Corporation,
Manufacturers of Infrared Spectrometers, Flame Photometers and Electro-optical Instruments.

PROBLEM:

To assay khellin and visnagin in an extract of seeds of Ammi visnaga Lam.

PLANT:

Smith, Kline & French Laboratories, Philadelphia, Pa.

SOLUTION:

Infrared analysis. The crude extract is dissolved in chloroform and the infrared spectra determined between 8 and 9 microns. In this region the spectra of khellin and visnagin are sufficiently different to permit their accurate estimation (see spectra, right).

INSTRUMENTATION:

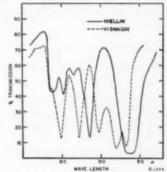
Perkin-Elmer Model 21 Spectrophotometer, sodium chloride optics, standard liquid absorption cell with 0.1 mm spacer.

DISCUSSION:

Because of their chemical similarity (see below), khellin and visnagin are difficult to determine chemically in a crude extract. Because of their widely divergent spectra in the 8 to 9 micron region, the assay of khellin and visnagin mixtures becomes a routine infrared analysis. Time per assay: 20 minutes.

REFERENCE:

J. of the Amer. Pharm. Assn., Sci. Ed., XL, 6, 1951, pp. 280-286.



Comparison of the absorption bands of khellin and visnagin in the 8-10 µ region.



Perkin-Elmer Model 21 Spectrophotometer aids new product development at Smith, Kline & French.

Let us discuss your Product Control Problems with you.

THE PERKIN-ELMER CORPORATION

NORWALK, CONNECTICUT



ARE YOU RECEIVING INSTRUMENT NEWS?

This 8-page quarterly brings you the latest developments in electro-optical instrumentation as well as their application to research and process control.

MUL CLEAR WITH WAS

BULLETIN 551 - Just off the press will give you factual information on Paint, Varnish and Lacquer installations for cooking, mixing and handling applications.

Write for your copy today!

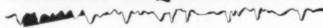
CLAUDE B. SCHNEIBLE CO.

P.O. Box 502, Roosevelt Annex Detroit 32, Michigan





COOLING REQUIREMENTS



It's not too late to order a CHILL-VACTOR for use mext summer. Since it takes three or four months to design, build and ship a complete CHILL-VACTOR unit you ought to start thinking NOW about next summer's cooling requirements. Begin now to assemble your data, check your capacity requirements, and be ready to specify equipment which will pre-vide maximum benefit.

CHILL-VACTOR equipment answers the need of chemical and process industries for:

Maintaining proper temperatures in certain solutions

Chilling various reaction vessels. Special cooling requirements.

The Croll-Reynolds CHILL-VACTOR is one of

Maintenance and repair costs are practically all. Operating costs are usually less than for other types of refrigerating equipment where ample condensor water is awail-

Inquiries will receive the cureful attention of engineers with many years specialised ex-perience in the field. An engineering survey

the most dependable and efficient units available for many cooling requirements in the range above 32° F. It has no moving parts other than a standard chilled water circulating pump. Water is the only refrigerant.

CROLL-REYNOLDS CO., INC.

Main Office: 751 Central Avenue, Westfield, New Jersey 17 JOHN STREET, NEW YORK 7, N. Y.

CHILL VACTORS . STEAM JET EVACTORS . CONDENSING EQUIPMENT



QED, cont. . .

6. Defense Problem for Chemical Industry Is Unique: "The chemical industry cannot convert to defense work like the hard-goods industry. Conversion of a bobby-pin manufacturer to the production of arming wires for bombs is not hard to conceive . . . but the cold fact remains you can't make anything in a sulphuric acid plant except sulphuric acid."

Charles H. Carter, Jr., assistant general manager of Atlas Powder Co., pinpointed the problem nicely. The problem for the chemical industry is not a drastic conversion but rather adapting chemical products to the needs of a semi-military economy.

The industry must also adopt what Carter calls, "citizen's responsibility in the nation's defense." Trends this year in defense activity, if the meeting is a criterion will follow this line.

What specific action may be taken? · Industry may provide management for the design, construction and operation of government explosives and chemical plants—a necessary move, but a big sacrifice in light of manpower shortages.

· Formation of separate committees and departments to act as control groups to make recommendations to management on policy concerning government work; to maintain liaison with defense agencies; keep management informed on changes in government policy regulations and procurement methods; advise on security precautions: and obtain information on government research and development work.

· An expanded safety program since speed and stress tend to increase industrial accidents.

 Cooperation with government agencies and the semi-official societies such as the American Ordnance Association, Armed Forces Chemical Association and the National Industrial Security Association by lending manpower and giving technical assistance.

In organizing for defense, President Richard L. Davies of Pennsalt feels, responsibility must begin at the top but shared by all. The man in the factory must see the necessity of actively defending the plant, which is a big problem. Company officials, plant superintendents, engineers and even salesmen will have to take on extra duties and specific defense jobs.

Although industry does not want to nag, it still has some gripes. The government, some of the more farsighted chemical men feel, has put too much emphasis on the quantities of chemicals and types of chemicals used in World War II. We are not sure we are going to fight the same

February 1952-CHEMICAL ENGINEERING

kind of war. So far industry is in the dark about future defense needs and military requirements. Complaint is rampant among small producers who find little relief from the mounds of government paper work.

In spite of the many differences this year, liaison should be bettered between the two very strange bedfellows of industry and government.

7. Labor Relations: A Clash of the Old and New. "It takes time to establish good relations but the time required is much less than is needed to settle a continuous flow of grievances.

In many respects this statement by John Davenport, vice president of Pfizer & Co., represents a new attitude. Practical rather than idealistic, clear-eved rather than enthusiastic, it preaches prevention as the best cure.

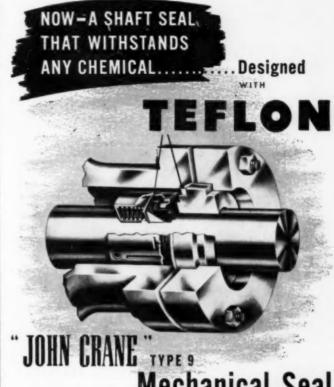
This year there is a lot of prevention ahead. Unions are certain to make new demands. Much hinges on any action taken by the steelworkers. But steel or no steel, the chemical unions soon will be after higher insurance benefits, improved pensions, cost of living raises and shorter contracts (1 year maximum).

Influence of the oil workers may also bear watching. With the growth of the petrochemical industry and the exodus of chemical companies to the Southwest, the Oil Workers International Union (CIO) becomes more active. The oil workers will soon ask for 25 c. per hr. pay increase. Their pay is already higher than chemical pay. And with profit margins about the same in the chemical industry as in oil, the drive will be on to even-up chemical pay. Management will have little defense.

One trend seems certain. Labor is carrying its grievances to Washing-ton, particularly to the Wage Stabilization Board-which seems natural considering the arbitrary power of government in these abnormal times. Bargaining tends more and more to take place between labor and industrial members of the WSB.

This loss of bargaining rights is a cause of much worry. But the fear of the year is further unionization. Union targets could be the technical and office forces. Because of so much defense and external matters, many fear rules will be relaxed and less resistance offered to union intrusion. But the consensus of chemical men is that intrusion can be stopped by offering even better benefits than the union. "If they organize, it's our own fault," said Union Carbide's Wilfred H. Winans.

From all the chortle and talk, two strong and opposing schools of thought emerged. The issue over the United Nations' International Labor



Mechanical Sea

Prevents Leakage of: V EXPENSIVE CHEMICALS INFLAMMARIE LIQUIDS TOXIC GASES CORROSIVE LIQUIDS SOLVENTS

Other John Crone Teflon Products include expansion joints, C-V Rings, packings and gaskets. Also, parts molded or machined to your particular re**quirements**

This revolutionary seal was developed by Crane Packing Company after two years research and field testing-expressly for use with hard-tohandle chemicals. Its flexible wedge ring and sealing ring are molded from the remarkable new plastic, Teflon, which is not affected under any known corrosive or solvent service.

John Crane engineers thus put the unique properties of Teflon-high heat resistance, extremely low friction and chemical inertness—to practical use in the Type 9 Seal. Result: a new, efficient way to handle corrosive liquids and gases that never before could be effectively controlled by conventional, flexible-type mechanical seals. It can be employed at temperatures up to 500°F.

The Type 9 Seal gives consistently dependable service on all rotating shaft applications, such as centrifugal pumps, turbines, speed reducers, positive displacement pumps and agitators.

Write today for new booklet describing the John Crane Type 9 Shaft Seal





Leading chemical engineers prefer these features of the Fletcher.

- Largest capacity in proportion to basket diameter.
- Permanently safe operation due to extra safety factor.
- 3. Handles unbalanced loads easily.
- Offers highest speed in loading, acceleration, running, braking and unloading.
- The only centrifugal with Centroid Speed Control.

For full details . . . write for catalog entitled "Fletcher Centrifugals for the Chemical Industry".

FLETCHER CENTRIFUGALS

INDUSTRIAL LIGHTING FIXTURES

every safety lighting need!

For efficient illumination and maximum indoor and outdoor protection against non-inflammable gases, vapors, dusts and moisture. A complete line available in pendent, ceiling and bracket types from 15 Watts through 500 Watt sizes. Bases remain vaportight when globes are removed or broken in service.

WHITE FOR CATALOG No. 5049-5

EXPLOSION-PROOF

CLASS I, GROUPS C & D

For greater safety in hazardous locations wherever flammable materials are made or used. A complete line is available in pendent, ceiling, bracket and hand types—from 100 Watts through 500 Watt sizes. Standard conduit bases permit interchangeability of reflector globe assemblies.

WRITE FOR CATALOG No. H-47-5

DUST-TIGHT

CLASS II, GROUPS E, F & G AND CLASS III

For hazardous locations where flammable or explosive dusts are present. Streamlined design prevents dangerous accumulation of dust particles. Two exclusive design features facilitate easy cleaning and relamping. Standard pendent and junction box bases accommodate any style of fixture—globe—assembly interchangeably in either 100 Watt or 200 Watt sizes.

Watt FOR DATA SHIET No. 7151-5

USSELL & STOLL

QED, cont. . .

Organization brought them out. The older school did not wish to send representatives to this year's meeting. They thought it was not worthwhile joining an organization dominated by European socialists and unionism in general.

The new school feels the U. S. belongs in the organization, and that American capitalism is not that bad off. They believe American union leaders are basically conservative, and would lean more to the side of American business than European socialism. This school, which is becoming more of a force all the time, is opposed to any paternalism; but is inclined to trust in a free and fair competition between management and labor.

8. Public Relations: What Are the Common Problems? "The chemical industry . . . has no lack of problems. By that I mean industry problems, problems the companies have in common as distinct from individual problems. In no industry have the companies done a better job in handling their individual problems than have those in the chemical industry. These mainly are competitive problems. But until now they have given little attention to their common problems." According to John Hill, MCA's

According to John Hill, MCA's new public relations chief, the chemical industry has to seek out and define these common problems. They range from the more obvious and immediate to those that lie deep in the subconscious strata of public opinion.

Today there are two groups of problems. One is short range, the other long range. Plans are already under way to grapple with the first group that includes chemicals in foods, matters related to the Defense Mobilization Program and technical manpower.

In the long range the first job will be to win and increase public favor and support for the industry. The second job will be to define the specific industry-wide situations that could create long range public relations problems. Then specific activities and methods will be devised to meet these problems.

Ultimate goal will be to gain for the chemical industry the stature its more glamorous products have. First step will take place through tested methods of communication to the public including information to the press, radio and TV, materials for educators, public speaking, motion pictures and a regular periodical for opinion leaders.

Second step will be a bid for public esteem. Such high area work will

A DIFFICULT PROBLEM

"As the chemical industry has grown, it has like all expanding industries, developed many problems, not the least of which relates to government."

J. MARK HIEBERT, Executive Vice President Sterling Drug Inc.

include some imaginative and outstanding project of public service. The chemical industry fortunately is in a good position to dramatize its interest in public welfare. The industry is basic and all other American industries must rely on it for raw materials. In addition, a wide range of its products—many of them dramatically new and different—are used directly in foods, medicines, clothing and shelter.

To bring this home to the public, this year may see an industry financed research project of such scope as to command national attention.

Public relations are something new to the whole of the process industries. As Hill has pointed out, the problem this year is not so much what to do, but to define the problem—to find out what has to be done. Much can be learned from the study of the activities of other large industries. The spade work has been started, by the end of 1952 a lot of building should go up.

A New Technology. An over-all view of this year's eight big problems permits some cold observation. Several things seem evident. First of all, the status of international affairs has created most of the head-aches. Specifically, the defense program with its supervision from above is the cause of much worry. However, whether it likes it or not, the chemical industry is implicitly involved in the mesh and mess of government directives, regulations and statutes. And it will be for some time.

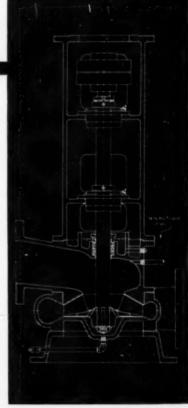
The problems have also created additional, and somewhat deeper responsibility. The chemical industry has picked up through the invitation of current events a new role of the citizen—with what it calls a "citizen"s responsibility."

In recent years, and certainly this year, it will take on heavier responsibilities to labor and personnel. It has never lost its responsibility to its stockholders. Sooner or later this twain must meet. Result is a neat dramatic conflict requiring no mean amount of prudence to resolve. Nevertheless cogent attempts, if this winter's meeting of the MCA is any harbinger, have been made for 1952.

The chemical industry, though still young and lusty, shows signs of maturing. The outlook of a new techRight: Cross-section of Lawrence Vertical Top Suction Pump for pumping volatile liquids.

Below: Vertical Top Suction Pump.





Pump

VOLATILE LIQUIDS

- Under a Low Net Positive Suction Head (NSPH)
- Under a High Vacuum
- Without Air or Vapor Binding

When handling volatile liquids under a very low Net Positive Suction Head—from evaporators, for example — a horizontal pump is apt to become vapor-bound. Air or vapor binding is impossible if you install the Lawrence Vertical Top Suction Pump illustrated above. Extremely high vacuums are maintained by filling the space around the packing box with water or some other sealing liquid. The costly delays and shutdowns resulting from vapor binding and loss of vacuum are completely eliminated.

Lawrence Vertical Top Suction Pumps can be furnished in special resistant metals and alloys to handle the most corrosive and abrasive acids and chemicals.



Send for Bulletin 203-4 for complete summary of acid and chemical pump data.

LAWRENCE

369 MARKET STREET, LAWRENCE, MASS.

We Invite Trouble

"Send us your inquiries" is never a perfunctory gesture with us. If your question pertains to the chemicals we manufacture, their actual or potential derivatives, their uses or possible uses, our organization will attack it with sincere effort and from their ability and experience will help you to the utmost. Incidentally, we do not call this work "trouble."

OLDBURY

ELECTRO-CHEMICAL COMPANY

Plant and Main Office: NIAGARA FALLS, NEW YORK

New York Office:
19 RECTOR STREET, NEW YORK 6, N.Y.

TABER for Higher PRACTICAL Performance

PUMPS for PROCESS INDUSTRIES





For the processing industries pumps need to be built for definite requirements. For this reason Taber Centrifugal Pumps will always prove far superior to stock or trade pumps.

• For example: there is a variety of impeller combinations for given-size casings; casings of various sizes for given-size yokes; over-size ball bearings, extra size shafts; extra deep stuffing boxes — all assembled and "Performance" Rated for final requirements of your job. • This is an indication of extreme flexibility and dependability of Taber Pumps. • Also pump built of any obtainable metal or alloy found suitable by customer. • Please use business stationery when writing for Bulletin CL. 339.

TABER PUMP CO. (Est. 1859) 294 Elm St., Buffalo 3, N. Y.

TABER PUMPS

QED, cont. . .

nology is eatching on. New problems create new demands for practical intelligent thought; new demands create new attitudes and new ideas. This year should be a fine testing ground for many.



CORPORATIONS

. . . Monsanto's Fifty Years

In 1901 John Francis Queeny, a tall lean man of straight-run Irish ancestry, went into the saccharin business to make a little extra money in his spare time. He named his company after his wife's maiden name, Monsanto.

Last year Monsanto celebrated its first fifty years. For the anniversary issue of its magazine in December, the company had former Time, Life and Fortune editor Hubert Ames Kay write its feature article, a sort of preview of a book to be published this year on the history of Monsanto. Commented writer Kay:

"Despite its mature years, Mon-santo is one of the youthful giants of American industry, far too dynamic to hold still for a definitive portrait. Since 1901 it has grown from a precarious \$5,000 venture in a corner of a warehouse on St. Louis' South Second Street into a corporation with some \$250,000,000 in assets; 19,000 employees: 28 plants in the United States, Canada, Britain. Australia, Mexico, Brazil, Japan and Argentina. Last year it earned \$26,000,000. In 1951 its world sales are running at a rate of near \$300,000,000 a year. Measured by sales and assets, the company is roughly five times the size it was 10 years ago. There seems no limit to its swiftly-continuing expan-

RESEARCH

. . . the Enigma of the IQ

Science does as science is. In the last thirty years science has attempted to measure the skill of its own top men. To do so it has called on one of its best instruments, the common denominator of the intelligence test.

Results have never been too reveal-

ing: A 160 mark, or genius quotient, is expected—and sometimes found. But all too often the marks are not too hot.

In a recent article in Scientific American, Dael Wolfe, director of the Commission on Human Resources and Advanced Training, offers an explanation:

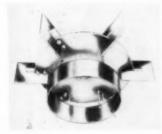
. . psychologists Anne Roe recently studied 60 of the most eminent research scientists in the U.S. and found that they varied considerably in intelligence. What the 60 had in common was an intense driving interest in their chosen fields of science. They had become America's most eminent scientists despite the fact that they would not all make the very highest scores on an intelligence test. As for the little-understood gift of creative talent, it is apparently not restricted to geniuses; it exists in lesser amounts in many people—the people who develop short-cuts, who put ingenious new ideas into the suggestion box, who think up improvements on

old routines. No one knows for sure.

but it is quite possible that creative talent is qualitatively the same sort

of thing in such people as in geniuses, the only difference being that the

latter have more of it."



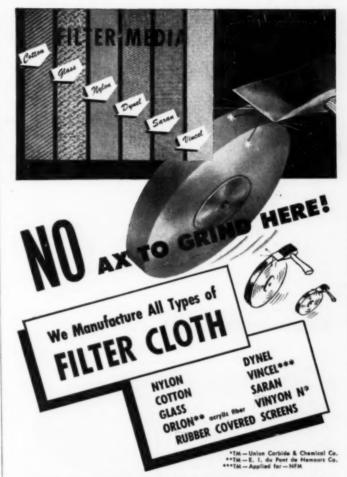
MIXERS

... 5 Tips on Shaft Vibration

With mixers, most mechanical trouble comes from shaft vibration. In a recent bulletin of Mixing Equipment Co., Inc., chief engineer R. D. Boutros gave five ways to prevent such trouble:

Don't run a mixer within 20 percent of the calculated critical speed speed.
 Calculations of the critical speed are seldom accurate. Many things influence critical speed that cannot be analyzed. For example, you can't analyze the effect of the stiffness of the tank and nozzle, the bearing mountings, and the mixer mounting. Such factors greatly alter the calculated figure.

 You cannot make the mounting too strong: A standard mixer, of a design manufactured for many years,



As manufacturers of an extensive line of Filter Cloths our analysis of and recommendations for your filter cloth problems will be unbiased...we have "no ax to grind" regarding any particular cloth.

Each of the cloths listed above offers different operating advantages. Each type has its own range of chemical resistance, its own temperature limits and its own degree of resistance to moisture, molds, fungi and bacteria. With such a variety we are in position to recommend a filter cloth that will give you the best service for your particular application.

In writing for literature and test samples please tell us about your problem.



Sales Offices-Representatives

Chicago, III. 2627 West 19th St. Cincinnati, Chio Bosolown Contac Bidg. Resiten, Texas Sacund Matienel Bank Bldg.

Ocia, Harwoy Micelei Friis Johannesburg, Sauth Africa Edward L. Betoman

you

can't drop a nail through this grate

Climb up high and drop a steel nail on this magnetic grate. Or throw nail as hard as you can against it. The nail simply can't get through.

It's obvious that the nail or other iron or steel piece will first strike a grid wire or a grate bar. That will check the momentum. Then the object will be caught with a strong magnetic grip.

The Bauer Magnetic Grate is laid on a frame in a hopper throat or floor opening to catch all steel and iron inclusions in flowable materials grain, nuts, seeds, fruits, coffee, tea, spices, sand, clay, lime, chemicals. The grates work well in liquids, too.

Ask for Bulletin M-3-A which fully describes the magnetic grate and other Bauer Magnetic Separators.

THE BAUER BROS. CO.

1726 Sheridan Ave. • Springfield, Ohio



These temperature responsive resistors are useful as temperature measuring elements and as liquid level sensors; they are especially well suited to compensation where the circuit constants must be maintained irrespective of temperature changes. Since they are a fired ceramic, they are stable under practically all conditions and respond only to temperature changes.

Many other values can be obtained from standard diameter material. Bacausa the thermistors are made in our own plant, under attremely careful central, special compositions, shapes, and resistance values, harmetically sealed or otherwise protected, can be made in any quantilies to suit your individual requirements. We invite your inquiries

BENDIX-FRIEZ STANDARD ROD TYPES

Size (inches)	@ +30°C.	@ 0°C.	@ −30°C.
.140 x %	45 ohms	88 ohms	193 ohms
.040 x 1.5	14,000 ohms	29,946 ohms	74,676 ohms
.018 x 1.5	40,000 ohms	94,040 ohms	262,400 ohms

Typical application in capsule form for temperature sensing of hydroulic all. .

FRIEZ INSTRUMENT DIVISION of 1324 Taylor Avenue • Baltimore 4, Maryland Expert Sales: Bendu International Division, 12 fifth Ave., N. Y. 11, N. Y.



QED, cont. . .

would not operate in air on a user's tank. Every time the mixer was turned on, the shaft vibrated so badly it broke. After three shafts broke, the mixer was returned for examination.

When the mixer was mounted on a tank in the laboratory, it ran perfectly. In fact, for nearly two weeks every effort was made, without success, to make the mixer shaft vibrate.

Finally, after many changes in the mounting were made, the shaft did vibrate. As a result of the investigation it became apparent that the mounting of the mixer had altered the critical speed. The actual critical speed of the unit, mounted on the user's tank, was so close to the operating speed that the shaft failed. A sound, solid mounting is most important.

• During draw-off and filling of the tank, don't run the mixer faster than 40 percent of its air critical speed: Of course this isn't always possible because the speed may not be practicable. Or for a long shaft you may find that the shaft diameter will have to be too great to be economical.

• For draw-off and filling operations, put a steady bearing in the tank: This increases the critical speed and steadies the shaft. But there are lots of installations where you won't want a steady bearing, and some where you can't use one.

• Also for draw-off and filling, put a stabilizer under the bottom impeller: We had a job where a steady bearing could not be used and a long overhung shaft was needed to run the mixer at the lowest possible liquid level. To make it worse, everything in contact with the tank contents had to be aluminum. After a careful analysis of the critical speed, a stabilizer was set under the turbine. This 5 hp. mixer running at 90 rpm. with a 2½ in. diam. aluminum shaft overhung 11½ ft. ran perfectly at all liquid levels.

Ouite often, because a process is continuous and the mixer will not be running during draw-off and filling, a stabilizer or steady bearing will not be specified. The mistake here is that the project engineer is not the operator, and vice versa. It is very rare that someone won't turn the mixer on before the tank is filled, or forget to turn it off until it is empty, when the process starts or stops at some time. There is no reason to take such a chance to save as little as the cost of a stabilizer or a steady bearing. If the mixer and tank are of alloy construction, or glass coated, the value of a stabilizer or steady bearing as a safety precaution, is certainly obvious.

Stabilizers are only effective when

mounted under the bottom impeller. Here they enter the liquid first and leave last. And stabilizers are effective with all kinds of impellers.

Another tip: Unless the mixer is going to run over 2,000 rmp. you won't need to balance the impeller and shaft assembly dynamically. Experience has shown that a static balance is enough.

EDUCATION

. . . Use of Lantern Slides

Last month at the annual meeting of the Society of Automotive Engineers in Detroit, Ethyl Corporation's Bernard A. Jones dropped some useful hirts on lantern slide technique. A few are:

• Have a professional in the graphic arts field make them up. Amateur efforts, experience shows, are usually illegible and frequently confusing.

 A slide should be distinctly appealing as well as completely legible. A common error: the use of small lettering, and compacting too much maternal on a single slide.

 Because they are simpler to follow and more attractive to the eye, colors are preferable to different kinds of lines or symbols.

 A dress rehearsal before a small but critical audience, with the projectionist working with the speaker, will improve actual presentation.

 The room should be partially or dimly lit. A completely darkened room, with lights being switched on and off, definitely interferes with concentration.

 Don't use slides simply to lend variety to a presentation. They should be used only to clarify an idea, to emphasize an important point, or to enhance interest and hold the attention of the audience.

PETROLEUM

. . . New Synthetic Catalyst

In an internal combustion engine, a more controlled combustion would mean more power and less wear on the engine. For some time Russian-born catalysis expert Sophia Berkman of Associated Development & Research Corp. has been trying to get just such control.

Last month she announced the development of a new synthetic catalyst that will control the type and rate of combustion, up horsepower of ordinary 76 octane gasoline 33 percent, and practically eliminate carbon formation.

The catalyst is made up of many minerals and ores (up to 27), each

WESTON Readable ALL-METAL THERMOMETERS

-AVAILABLE IN THESE 3 TYPES







Literature describing Weston all-metal, as well as electrical and glass thermometers, sent on request. WESTON Electrical Instrument Corporation, 583 Frelinghuysen Avenue, Newark 5, New Jersey . . . manufacturers of Weston and TAGliabue instruments.

STANDARD INDUSTRIAL THERMOMETERS

All-metal dial types with stainless steel stems, in straight and angle forms. Scale lengths 3"-6" and 9", with stems from 2½" to 72". Available as testing thermometers, and for general purpose and heavy duty service. Ranges from -100 to +1000°F. All-metal construction prevents breakage, assures dependable accuracy for longer periods.

CONTACT MAKING THERMOMETERS

Combines the features of the all-metal indicating thermometer with an alarm or control device. Has adjustable contact arm mounted in the glass and bezel. Supplied to make contact on increasing or decreasing temperatures. Has positive magnetic type contacts. Contact rating . . . 100 ma at 110 volts a-c; 50 ma at 110 volts d-c. Stem lengths 2½" to 24".

MAX-MIN THERMOMETERS

Equipped with a manually set red index which moves up or down scale with pointer, remaining at extreme temperature reached until reset. Thus one reading gives present temperature, and maximum or minimum reached since last reading. Available in scale lengths of 6° and 9"-stem lengths 2½° to 24°.



ABSOLUTE UNIFORMITY of your product by PROPER BLENDING of BUILK MATERIALS

Absolute uniformity of your product is easily, economically accomplished with the TOTE SYSTEM*. Tote permits pre-testing of all types of bulk materials before packaging: by economically blending insures a uniform finished product.

Tote's scaled bins protect quality. Material comes out of Tote's aluminum bins in exactly the same condition as it entered the bins

Tote means greater plant efficiency, cuts labor, packaging and warehousing costs. Manufacture on three shifts, package on one with Tote.

Let us tell you how Tote can solve your material-handling 'IDE and IDE SYSIEM problems. Write for detailed illustrated literature. Rug. U.S. Pat. Dft.

Write Dept. B

TUTE SYSTEM INC. 600 So. 7th. Beatrice, Nebraska

When You Call For Any Industrial Requirement
In Piping



ALBERT

SPEEDLAY PIPE SYSTEM—completely packaged for fast-laying temporary and semi-permanent lines for water, compressed air and other services.

PILING—Sheet Piling—light weight * Tubular—all sizes
PILE SHELLS—Spiral Welded, Hel-Cor, Riveted, CAISSONS

PILE FITTINGS—All types and sizes for steel and wood, cast steel and iron points. Plates and shoes cast steel and malleable iron sleeves.

CULVERTS—Corrugated, Spiral or Riveted Steel.

VALVES AND FITTINGS—Tube turns, Dresser, Vitaulic, cast iron or steel, forged steel, special alloys, water main.

ALBERT

Berry at North 13th St. Bracklyn 11, N. Y. Phane Evergreen 7-8100

SPECIALISTS IN PRE-FABRICATED PIPING

QED, cont. . .

with a specific function. Magnitite aids dehyrogenation, ulexite for oxidation, carnotite for decomposition, roulitite for carbonium ion mechanism, cryolite for binding and bentonite for plasticizing.

Theory behind the process is complex. Dr. Berkman reasons that crude oil acquired its chemical structure as a result of the varying catalytic actions of mineral substances in the earth's strata. This accounts for the differences in the composition of crude oil and explains why oils in adjacent fields are sometimes chemically different. On the other hand, minerals affect the catalytic cracking of crude oils. Therefore, minerals and ores, through their individual catalytic actions could control the type and rate of combustion within the internal combustion engine.

The catalytic operation is a carbonium ion mechanism. The acidic oxide type catalyst makes available protons, capable of producing carbonium ions in contact with petroleum hydrocarbons. The initial ion then undergoes hydrogen exchange with another hydrocarbon molecule and the propagating ion continues its activating action.

The catalyst is cast into the cylinder head or piston. For a multicylinder engine the cost is less than a dollar. The ultimate cost, however, would be determined by individual engine manufacturers, who will have to adapt the catalyst to their particular model. It should represent a small fraction of the total cost of the engine.

No research has been conducted on the possible use of the catalyst in diesel engines, oil burners or jet engines. But it should be adaptable. Associated Development believes it may eventually provide improved and more stable catalysts for cracking plants.

RECOVERY SYSTEM

. . . An Attractive Feature

The magnetic properties of ferrosilicon make it a highly desirable agent in the revamped HMS, or heavy-media separation process.

Brought to national attention in 1949, the process cheaply removes cherts from limestone, or removes coal, waterlogged wood fragments, or reactive aggregates from commercial stone. Operation is a simple one. A minus 2-in. rock is placed in a heavy fluid mixture. Separation takes place as the lighter rock floats and the heavier sinks.

But until ferrosilicon was used as

the medium for the heavy fluid mixture, the process was relatively expen-Acetylene tetrabromide was sive. first tried as a fluid mixture. It had some success in laboratory work, but was not practical for commercial operation.

Gelena, lead sulfide, was then tried as a medium. Ground in water to form a pulp, it did not settle out. The American Limestone Co., developers of the process, put it to work for ten years at its Mascot, Tenn. plant. But the advantages of ferrosilicon became known, and the plant converted.

When the switch was made, operating costs dropped from 21.2c. per ton milled, to 9.12c. per ton. Interest quickened in the rock industry.

"We predict in the years ahead that HMS will become an integral part of rock processing techniques and will play an important part in the processing of concrete aggregates," said American Limestone's Walter Lenhart.*

Ferrosilicon can be recovered magnetically; this is its big advantage. It forms, when mixed with water, a heavy and satisfactory pulp. And by use of magnetic devices, the pulp can be flocculated or de-flocculated at will. The recovery of ferrosilicon adhering to the sink and float fraction is cheap and extremely efficient.

• Rock Products, Nov. 1951, p. 64.

PETROLEUM

. . . An All-Out War

No crystal ball can come up with the numbers on the military demands of a hot war. The nature and date of outbreak of such a war will be the big factor. Nevertheless much can be said.

Recently before a meeting of the ASME in Atlantic City, Adam K. Stricker, Jr. of the Business Research Staff of General Motors had much to say. He predicted the effects another war will have on a number of petroleum products.

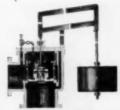
Past experience, Stricker commented, has indicated that the nation's oil companies can minimize civilian dislocation that would accompany an all-out war, while meeting the needs of the Armed services.

EASY WAY OUT

"When an engineering student has learned to think and has realized the necessity for communicating, the taskwork has been taken out of his learning to write."

THOMAS FARRELL, English Professor University of Iowa

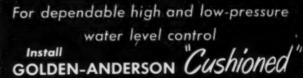






Sizes ½" to 2", cold water, all bi action, pressure 20 psi to 175 psi





FLOAT VALVES

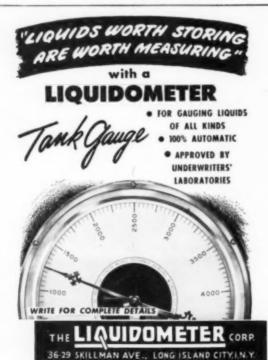
Illustrated above are a few of the many Golden-Anderson float operated control valves designed for either cold or hot water, open or closed tank service in reservoirs, tanks, coagulating basins, mixing chambers, etc. These valves may be of either the quick-opening or throttling design with integral or remote pilot control-available in angle or globe body pattern. This special air and water cushioning feature prevents any chatter or bang in operation.

Write for our engineering bulletins. They will interest you!



2099 KEENAN BUILDING * PITTSBURGH 22, PA.





QED, cont. . .

U.S. oil companies have invested over 10 billion dollars in new facilities and improvements since the end of the last war. They have reinvested more than 50 c. out of every dollar earned. This investment has boosted the capacity of the industry by one-fourth. However, in an all-out war rationing would be required.

Kerosene: A hot war with a great expansion in the jet program could easily absorb all available kerosene and introduce a serious problem of meeting even the most essential civilian kerosene requirements.

Distillate: A greatly expanded jet engine program in wartime is certain to exert pressure on distillate fuel oils. In fact, distillate fuel oils will bear the brunt of the load because these oils have so many different uses: heating oils, diesel fuel, jet fuel, or as charging stock to make gasoline in catalytic cracking. In wartime all of these uses will be competing for an inadequate supply.

If military distillate requirements in an all-out war were no greater than they were in 1944, the industry's postwar expansion would mean military demands would take 11 percent of total supply, as contrasted with more than 19 except in 1944.

than 19 percent in 1944.

World War II experience shows that steps can be taken to reduce the consumption of heating fuels. Oil industry economists estimate a maximum reduction of 25 percent is possible as an emergency measure.

If 1950 heating consumption were reduced by 25 percent, the military distillate requirements at the 1944 rate could be met without curtailing other uses. Political pressures permitting, in view of the essential nature of the other uses, it would seem that domestic space heating would have to bear a large portion of the diversion required in a program during an all-out war.

Residual Oil: The Navy, in an allout war, will require large amounts of residual for its larger vessels and transports. Residual oils have been imported during much of the postwar period. During war, industrial users of these oils have peak demands. And refiners will be under pressure to meet all requirements.

ULTIMATE GOAL OF TECHNOLOGY

"We are prone to ascribe to our technical results a completeness and finality to which they are not entitled. Such results are valueless until they enable the achievement of some useful human purpose."

R. P. DINSMORE, Vice-president Goodyear Tire & Rubber Co.



HYDROGEN COOLED GENERATOR: Exciter end showing hydrogen impeller.

COOLING SYSTEMS

... "Fully Hydrogen-Cooled" Generators

Designers have been playing with the idea of hydrogen-cooled synchronous generators since the early 1930's. But until the present they have built nothing but air-cooled units adapted for hydrogen cooling. Sterling Beckwith, a design engineer of AlisChalmers and author of a recent article in the company's Electrical Review, believes "the designer has to start from basic principles and design a hydrogen-cooled machine in the first place."

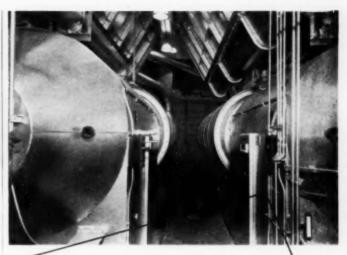
After several years of development, the first generator with a "fully hydrogen-cooled" rotor was put in service last summer.

The term best describing this new development, he noted, is "supercharged cooling," since gas pressures are equivalent to that obtained by supercharging. The supercharging blower, a modified centrifugal compressor mounted directly on the shaft at one end of the rotor, provides a gas pressure several times that obtained with cooling fans.

What It Means: The new gencrator is much smaller than the best previous designs. Besides smaller space requirements and higher fractional load efficiency, there are numerous other advantages. Compared with air cooling, supercharged cooling has raised generator ratings of given frame size 70 percent.

More advantages: smaller foundation and crane requirements, smaller bearings, greater overload rating of rotor at higher gas pressures, higher critical speed with reduced balance problems, and the ability of shipping larger machines completely assembled and tested. Also, the greater heat dissipating ability allows a more effective use of rotor copper.

How It Works: The cooling gas enters the supercharger from the main



Improve the quality of your output

Investigate
Cyclo-Matic
Drying

Efficiently process chemical and drug residues, sludges, sages, leafy plants, etc.

exclusive with

Cyclo-Matic Drying gives you highest quality output — that's relatively cool, due to rapid moisture evaporation, short retention time in drum. Accurately controls outlet temperature and moisture content. No boiler is required — heat exchanger losses are eliminated.

Arnold Dryers cost you less to buy, install, operate, maintain, Capacities, 2,000-12,000 lbs, of water evaporated per hour. See why Arnold's productive a true down

See why Arnold's exclusive 3-pass drum and showering flight design help you dry at lowest cost per ton. Send coupon for bulletins.

Arnold Dryers are manufactured by The Heil Co.

Arnold Dryers are successfully processing:

Chemical, drug, and antibiotic residues. Various sludges from vacuum filters. Various sages and leafy plants, prior to final extraction, etc.

ARNOLD DRYER CO., B	ept. 8722 Milwaukee 1, Wisconsin	
	nold Dryer bulletins.	
Name	Position	
	Position	
Name Company Company Address	Position	::E1

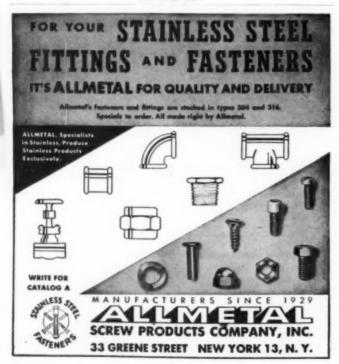


... HEY CURLEY... YA DON'T HAVE TO THAW OUT THAT
EXTINGUISHER...IT WON'T FREEZE!

You needn't worry about high or low temperature extremes with Ansul Dry Chemical Fire Extinguishers. All Ansul Extinguishers are tested and approved for -40°F operation. Special Low Temperature models are available for -65°F conditions. These same extinguishers can withstand prolonged exposure to tem-

peratures up to 160° above zero. Think of the savings these features give you! No heated cabinets. No freezing of unprotected extinguishers left outdoors in winter weather. No accidental discharge due to exposure to high temperatures in a boiler room, etc. Still Ansul gives you the best fire protection money can buy.

SEE PAGE 284



QED, cont. . .

gas circuit of the machine. After compression, the gas passes through one end of two of the four main coolers, and then enters each end of the rotor.

Since the amount of gas required for the rotor is small, it is economical to cool it to a temperature well below 40 deg. C., the main stator temperature. However, chief reason for cooling the rotor gas is to maintain the usual emergency rating with air instead of hydrogen.

METAL FINISHING

. . . Economies

For years, many metal-finishing departments have operated uneconomically, heedlessly disregarding the wasteful use of supplies. Unbelievable quantities of metal salts, acids, and cleansers are rinsed off or permitted to drip directly into the sewer. Batches of partly contaminated and weak solutions are dumped without an effort at salvage. Large losses also occur through breaks in lines, vats or storage units. These practices, if not curtailed, add to the size and cost of required waste-treatment facilities. Treatment-plant operation costs also are increased.

A plant can profit by salvaging materials through application of just plain common sense. Here are some simple, good-houskeeping principles:

1. Reduce dragout losses. The material being plated, upon removal from any processing bath, should be allowed to thoroughly drain directly back into the bath unless such practice interferes with the quality of processing.

In moving forward from a processing bath, any solution necessarily remaining on the work should be rinsed in a still-water or save-rinse tank. This rinse water should be returned to the processing tank.

Many case histories are available showing substantial savings of costly supplies through the use of save-rinse

DIPOLE MOMENT

"As indicative of the distance the engineers have risen in public repute," might recall that some years ago while crossing the Atlantic I took my meals at the same table with a cultivated English lady. As we came into New York harbor, at breakfast she said: 'I hope you will forgive my dreadful curiosity, but I should like awfully to know what is your profession.' I said that I was an engineer. Her involuntary exclamation was: 'Why, I thought you were a gentleman."

HERRERT HOOVER

"If metals are the skeleton and oil the lifeblood or our economy, then chemicals make up much of its flesh and sinew." HENRY H. FOWLER, Deputy Administrator National Production Authority

tanks. Dragout losses account for 60 to 100 percent of all supply costs—excepting anodes—depending upon the type of plating operation.

One save-rinse tank may reduce chemical supplies used by about 60 percent. Two rinses will result in nearly 80 percent savings of the supplies. Chemicals salvaged for reuse do not need to be removed from waste water.

2. Rinse effectively. Free rinsing can be assisted by utilizing racks and fixtures that are maintained in good condition-free from incidental metal buildup or corrosion. Clusters of nodules on plating racks do not rinse freely. Economy can be achieved by properly maintained and coated plating racks. Plate deposited on rack parts, or rack metal attacked by process solution, is material wasted. When the metal is attacked, the solution is contaminated. It is a frequent and deplorable practice to permit the area of rack build-up to equal or exceed the area of the work being processed.

3. Prevent leaks and losses. Any loss of solution through leaks is costly and causes waste-water contamination. Routine inspections and maintenance of all equipment should be scheduled, including inspection of tanks when

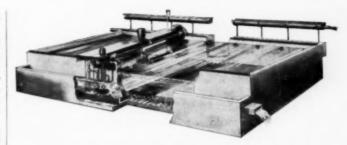
4. Salvage solutions for further use. Don't discard them. The expensive and ill-advised practice of discarding solutions which could be purified still exists. This practice continues in spite of published data on purification. Money goes down the drain when solutions are discarded. Extra expense and difficulty are incurred in replacing scarce raw materials.

No company can afford to discard any processing solution without first proving that it has no recoverable plating value.

It is cheaper to provide storage facilities for contaminated solutions that can be salvaged than it is to throw them away.

Sell or exchange baths that cannot be purified. A few solutions become contaminated in normal use so that they cannot be purified for further use. The possibility of selling or exchanging the condemned solution to another industry should be investigated.

Abstracted from Plating-room Controls for Pollution Abstract—a manual prepared by the Ohio River Vailey Water Sanitation Commission.

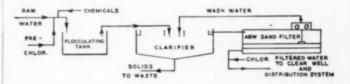


HARDINGE AUTOMATIC BACKWASH FILTER It CLEANS ITSELF while filtering!

Here is the sanitary engineer's dream come true! . . . a sand filter which cleans itself—automatically—with no interruption whatever to the filtering operation. No shutdown or change-over is necessary while cleaning is in progress.

The secret of this remarkable filter lies in its special, compartmented filter bed and traveling backwash mechanism which automatically cleans and removes the sludge from one compartment at a time—on a pre-determined time cycle or with increase in head pressure.

And . . . it's highly efficient, removing 75% to 80% of the suspended solids— 90% or better if chemicals are added.



The Hardinge Automatic Backwash Rapid Sand Filter has proven highly satisfactory on industrial as well as municipal water supply systems. In the town of Newton Falls, N. Y., for example, a single Hardinge ABW filter handles both the industrial water supply for the Newton Falls Paper

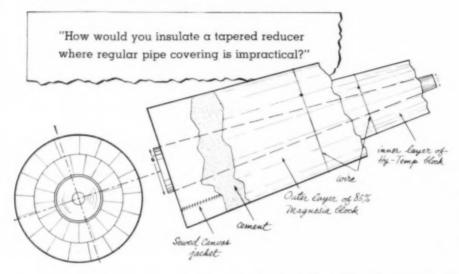
Mill processing operations and the town's water supply. The water produced by this ABW Filter installation contains less than one part per million of suspended solids in spite of the fact there is no flocculation or pre-sedimentation before filtering.

Bulletin 46-11.

HARDINGE

YORK, PENNSYLVANIA—240 Arch St. Main Office and Works
NEW YORK 17 • SAN FRANCISCO 11 • CHICAGO 6 • HIBBING, MINN. • TORONTO 1
122 E. 42ad St. 24 California St. 205 W. Wacker Dr. 2016 First Ave. 200 Bay St.

WE HAVE BEEN ASKED:



A power engineer wrote to us recently and outlined this problem: "We plan to insulate a 6" x 2" x 30" tapered reducer which carries steam at 350 lbs. pressure (725 F.) between a pressure reducing valve on a 2" superheated steam line (1000 F.) and a de-superheater. What insulating materials do you recommend and how should they be applied?"

To answer this question, we sent the drawing above and the following recommendation: To minimize heat loss on the 2" superheated steam line, regular pipe coverings of Hy-Temp and 85% Magnesia should be used. These are applied in two 2" layers according to standard specifications for this 1000 F. temperature. On the tapered reducer, the same insulation thickness is used. Here, however, blocks of insulation are applied instead of preformed pipe covering. These must be cut and carefully fitted around the conical shape, then wired securely in place. The layer of Hy-Temp is applied first.

This reduces the temperature on its outer surface to a point within the 600° F. temperature limit of the 85% Magnesia, which is then applied to further cut down heat loss. As is the case with the layers of pipe covering, inner and outer joints should be staggered to prevent through joints that result in heat leakage. Joints should be filled in and smoothed with cement. A sewed canvas jacket completes the job.

The next time you have any insulation work to be done, you'll find that Armstrong's thorough knowledge of insulation and its uses can help you. Our Contracting Service can handle the entire job for you—furnish fine-quality materials and the skilled workmen to apply them properly. For further information, just contact your nearest Armstrong office.

SEND US YOUR QUESTION. If you have any questions on insulating materials or their use in high- or low-temperature installations, please write us. We'll see that you get a prompt, practical answer. Address your letter or post card to Armstrong Cork Company, 3302 Maple Street, Lancaster, Pennsylvania.

ARMSTRONG'S INDUSTRIAL INSULATIONS

MATERIALS - INSTALLATION

FOR ALL TEMPERATURES FROM 300°F. BELOW ZERO TO 2800°F.





CORROSIVE FLUIDS?

this unique hard rubber lined iron body gate valve offers big savings in many corrosive services...

WHEN Darling gate valves of this type go to work, you gain multiple advantages sure to save you money and time.

First, you gain big initial savings because these rubber lined iron body gate valves (ideal for many corrosive services not exceeding 180° F.) are much less expensive than special alloy valves. Moreover, Darling's special bonding technique permanently prevents separation of the hard rubber lining from the valve body.

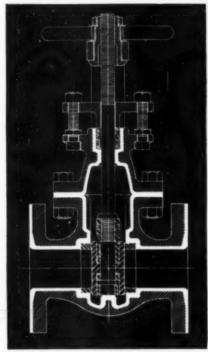
All interior working parts are made of alloys suitable for the corrosive conditions encountered.

Secondly, and equally attractive, is Darling's exclusive fully revolving double disc, parallel seat feature! In a nutshell this means drop-tight closure where most other valves would fail. It also assures unmatched life with a very minimum of attention and maintenance.

Here's a combination you just can't beat! Before you buy gate valves of any type, get acquainted with these unique Darling valves and their operating details. Get all the facts.

Write today for free bulletin describing Darling rubber lined gate and check valves.

DARLING VALVE &
Manufacturing Co.
WILLIAMSPORT 3. PA.



Darling 150-pound rubber lined gate valve, with outside screw and yoke, featuring unique parallel seat, fully revolving disc principle. Plain "no pocket" discs prevent accumulation of sediment. Darling rubber lined gate valves can be furnished only in rising stem, cylinder or motor operated; or quick-opening types.

DARLING VALVES FOR EVERY NEED

Darling parallel seat revolving disc gate valves are available in a wide range of sizes and constructions for all kinds of normal and unusual service, and for pressures up to 1500 pounds. In addition to rubber lined, iron body valves, corrosion resistant types include plain iron body with special alloy trim, cast steel, all bronze, special alloys or combinations as required. We'll gladly furnish specific recommendations on the proper valves for your particular service.



FOR PLUS VALUES, JOB-PROVED AGAIN AND AGAIN

CORRUGATED Oubestos TRANSITE*

For Exteriors



In this recently built plant, Johns-Manville Corrugated Transite is used effectively to provide utility and an attractive streamlined appearance.

For Interiors



In this modern retail shop, the deep shadow lines of Johns-Manville Corrugated Transite beighten the beauty of this striking interior.

You build economically and quickly with these versatile fireproof and weatherproof asbestos building sheets

In the past quarter century, Johns-Manville Corrugated Transite has proven an ideal material for roofs and for sidewalls of industrial, commercial, institutional and agricultural buildings. Made of asbestos and cement, the large sheets are easy to handle, go up quickly with a minimum of framing. Practically indestructible, Corrugated Transite is fireproof, rotproof, weatherproof, needs no paint or special treatment to preserve it, and can be salvaged and reused if necessary.

Today, Corrugated Asbestos Transite is also

used increasingly for smart interiors . . . the streamlined corrugations and attractive shadow lines that give it such unusual architectural appeal for exteriors offer unlimited interior design possibilities.

Investigate J-M Corrugated Asbestos Transite and learn how you can build quickly and easily . . . have an attractive, long-lasting, trouble-free structure regardless of size or purpose. For complete details write Johns-Manville, Box 158, Dept. CE, New York 16, N. Y. In Canada write 199 Bay Street, Toronto, Canada.



EASY TO FASTEN TO STEEL



EASY TO SAW



EASY TO DRIL



EASY TO NAIL TO WOOD



Johns-Manville



CORRUGATED TRANSITE

Chemical Engineer's Bookshelf Edited by Lesser B. Pope

Review .

In keeping with the theme of this issue of Chemical Engineering, we present a quick review of some 1951 books you may have missed.

PHOSPHOLIPIDES. The first modern text in English covers chemistry, analytical determinations, plant sources, animal sources, biochemistry and physiology, manufacture and industrial uses. Uses: wetting and emulsifying agents, moisture absorbents, antioxidants.

THE PHOSPHATIDES. By Harold Witteoff. ACS Monograph 112. Reinhold Publishing Corp., New York. 564 pages. \$10.

GRAPHIC AIDS. 92 nomographs of general engineering usefulness. Of possible use to chemical engineers: a dozen charts on powers and roots; two dozen on hydraulics; another dozen on thermodynamics. The remainder are general, mechanics and electrical-worth knowing about but of little probable use to us.

Nomographic Charte. By C. A. Kulman. McGraw-Hill Book Co., New York 244 pages. \$6.50.

PUNCHED CARDS. How they work; equipment and applications; general and specific information primarily for finding information. Some aspects of production control and scientific computations are covered. Extensive bibliography.

PUNCHID CARDS. Edited by R. S. Casey & J. W. Perry. Reinhold Publishing Corp., New York. 506 pages. \$10.

SCIENCE. A competent review of basic facts and an exposition of current theories for the four sciences: physics, chemistry, geology and astronomy.

THE PHYSICAL SCIENCES. Third edition. B. E. J. Cable, R. W. Getchell, W. H. Kadesci Prentice-Hall, New York. 442 pages. \$7.35.

FUEL OIL. A not-too-technical manual for purchasers or users of fuel oil. A good practical book to have if your duties take you into heat treating or (non-residential) building heating.

FUEL OIL MANUAL. By P. F. Schmidt. The Industrial Press, New York. 160 pages. \$3.50.

WEEDS. A competent bringing-together of botanical and chemical information on a rapidly growing science-and market for chemicals.

PRINCIPLES OF WEED CONTROL. By G. H. Ahl-gren, G. C. Klingman and D. E. Wolf. John Wiley & Sons, New York. 368 pages. \$5.50.

HIGH POLYMERS. Kinetics, structures, reactivity, rates, behavior, influence of copolymerization on physical properties, etc. A highly theoretical evaluation and literature review in the field of macromolecules.

COPOLYMERIZATION. By T. Alfrey, Jr., J. J. Bohrer and H. Mark. Interscience, publishers, New York. 269 pages. \$6.80.

PACKED TOWERS. The mechanics of packed tower operation, useful and reliable data on the capacity and efficiency of ceramic packing materials. In two parts: physical aspects; design methods and performance comparisons of packings.

Tower PACKINGS AND PACKED TOWER DESIGN (Continued on page 364)

. . . and Forecast

Here's part of what's ahead in 1952. These are a few of the technical books scheduled for the next few months.

POTASH. Production and agricultural uses. A review of commercial deposits and potential sources. duction and consumption. Also to be included: relation of potash to soils and crops, diagnosis of mineral deficiencies, requirements of various crops.

Forash. By G. A. Cowrle. Longmans, Green & Co., New York. 176 pages. \$4.

WASTES. Slanted toward industrial plant management. Covers the means available for treatment, proper sampling, testing to develop a treatment, the place of conis on helping management toward an economic solution.

INDUSTRIAL WASTS TREATMENT. By Edmund
B. Beasellevie. McGraw-Hill Book Co., New
York. (June 1952.)

ORGANIC. Five volumes to be a complete rewriting in English of the old standard-Richter's Organic Chemistry. Volumes will appear at 10-month intervals and cover aliphatics, alicyclics, aromatics, heterocyclics, miscellane-ous. Editors and contributors are all British. Priced on

a unique subscription basis: \$2.25 per hundred pages.
CHEMISTAY OF CARBON COMPOUNDS. Edited by
E. H. Rodd. Elsevier Fress, Houston, Tex.
About 4,000 pages. About \$90.

Factors influencing diffusion in bulk phases and across a number of interfaces between bulk phases. Emphasis is on diffusion in solids. Heavy on mathematics but note is made of approximations frequently involved in studying actual systems.

Diffusion in Solids, Liquids, Gasss. By W. Jost. Academic Press, New York. About 550 pages. About \$11.

CHEMICALS and DRUGS. A new edition of an old standby that deservedly has had wide acceptance in our profession. A handbook of chemicals as well as drugs and pharmaceuticals. 8,000 descriptions of substances, 2,000 structural formulas, 20,000 names alphabetically listed and cross-indexed. Sources, preparation, properties, uses (industrial and medical).

THE MERCK INDEX. Sixth edition. Merck & Co., Rahway, N. J. 1,167 pages. \$7.50.

HISTORY. Emphasis is on the 16th and 17 centuriesthe first two centuries of modern science. Included, of course, is chemistry and the progress of technology. 300 illustrations.

A HISTORY OF SCIENCE, TECHNOLOGY AND PHILOSOPHY. By A. Wolf. The Macmillan Co., New York. (August 1952.) \$7.

MINERALS. The long-awaited revision of Vol. II of Dana. Expanded, sharper, new. Continues the changes introduced in Vol. I (1944). Covers halides, nitrates, borates, carbonates, sulphates, phosphates, etc., with a complete description of each mineral included.

DANA'S STATEM OF MINERALOGY. Seventh edi-tion. Revised by Charles Palache, Harry Ber-man and Clifford Frondel. John Wiley & Sons, New York. 1,124 pages. \$15.









CHECK
CORROSION
FROM
ACIDS AND
ALKALIES
LONGER
WITH

The unexcelled resistance of rubber-base paints to acids, al-kalies, bleach solutions, and chlorine makes them ideal maintenance finishes for paper mills and breweries.

Economical to use, easy to apply, these tough coatings offer money-saving protection to metal surfaces . . . are especially durable on concrete, since they resist both abrasion and the free alkali in cement.

Rubber-base paints resist corrosion three to four times longer than ordinary coatings. Exceptionally satisfactory service results are obtained in numerous industries where surfaces are attacked by acids, alkalies, and salts.

These paints dry quickly...seal surfaces against corrosive solutions, temperature changes, and humidities. Ask your paint supplier for details or write:

HERCULES POWDER COMPANY

Cellulose Products Department 952 Market Street, Wilmington, Delaware BOOKSHELF, cont. . .

By Max Leva. The United States Stoneware Co., Akron. 119 pages. \$6.

SYNTHESES. Complete, ready-touse directions on how to synthesize 11 organic compounds. In this latest volume, as in its predecessors, the compounds have been selected on grounds of utility and general interest. Step-by-step accounts of the syntheses, with equipment descriptions; notes on the source of compounds used and conditions which may affect the syntheses.

ORGANIC SYNTHESES, Vol. 31. Edited by R. S. Schreiber, John Wiley & Sons, New York, 122 pages, \$2.75.

FLUORINE. Modern inorganic and organic chemistry of the fluorine field. The relation between structure and properties of inorganic fluorides. The influence of fluorine on the properties and reactivity of organic compounds. The book's four chapters deal separately with fluorine, hydrogen fluoride, inorganic and organic compounds of fluorine.

PLUGRINE AND ITS COMPOUNDS. By R. N. Haszeldine and A. G. Sharpe. John Wiley & Sons, New York. 153 pages, \$1.76.

HYDROGENATION. Correlation of industrial progress with the latest research on hydrogenation of fatty oils. Reports on recent investigations at the Technical University of Delft, Holland, with which the author was associated. Surveys principal sources of raw materials, methods used to obtain and refine them, analytical methods as applied to the classification of natural oils, and the examination of the products of hydrogenation.

Hyprogenation of Fatty Oils. By H. I. Waterman Elsevier Press, Houston, Tex. 254 pages. \$6.50.

ORGANIC. Topics of a fundamental nature, like molecular structure and the mechanisms of chemical reactions, are linked with discussions of the relevant compounds. Important groups of aliphatic, aromatic, alicyclic and heterocyclic compounds are systematically treated in succession to permit the student a clear insight not only into organic chemistry, but also its historical development.

HOLLEMAN'S ORGANIC CHEM-ISTRY. By J. P. Wibaut. Elsevier Press, Houston, Tex. 660 pages.

£

STATES OF MATTER. Five authoritative monographs stress fundamental principles. Field is broken down into the kinetic theory of ideal gases, thermodynamics and statistical mechanics of real gases, the liquid state, X-ray analysis of the solid state, the colloidal state and surface chemistry. Numerous tables, graphs, dia-



RUBBER-BASE (PARLON)° PAINTS

CR52-1



41% More Output With Faster Safer Lukenweld Driers

Sluggish drying slowing down your output? Here's a thought that may help.

A large eastern pharmaceutical manufacturer required faster flake drying for the production of a well-known proprietary product. By replacing two flaker units using conventional type drier rolls with units utilizing Lukenweld Jacketed Steel Drier Rolls, an average production boost of 41% was realized. Had higher pressures been used, the output "bonus"

would have been even more impressive. Greatly reduced maintenance costs provided still further savings. For, despite the action of 30% saline solution, the chromium plating of these drier rolls has lasted over six years.

Other type chromium plated rolls required refinishing every one and a half years.

If you have a job calling for roll drying, you can probably do it faster with Lukenweld Jacketed Steel Drier Rolls. Use of high strength rolled steel plate permits safe operation at pressures as high as 350 psi and higher. Restricting steam to a shallow annular jacket. Lukenweld design offers you faster heatup . . faster reflection of pressure variations . . , while installation costs are lower, maintenance minimized.

For information on Lukenweld flaking and drying and other processing machinery for the chemical field, write Lukenweld, Division of Lukens Steel Company, 400 Lukens Building, Coatesville, Pa.

Improved machinery for improved processes through engineering



A DIVISION OF LUKENS STEEL COMPANT

LUKENS

BOOKSHELF, cont. . .

grams and references provide material on special problems as well as theory.

STATES OF MATTER. Third edition. Edited by Hugh S. Taylor and Samuel Glasstone. D. Van Nostrand Co., New York. 701 pages. \$12.

Empire Building

ALCOA—AN AMERICAN ENTERPRISE. By Charles C. Carr. Rinehart & Company, Inc., New York. 292 pages. \$3.50.

Reviewed by R. S. McBride.

Unique interpretation of industrial history is presented in this volume which traces the story of aluminum from an unproved laboratory idea to a world famous industrial company. Many process-industry executives will find inspiration, as well as interest, in this tale which portrays an outstanding example of the working together of diligent young technologists, agressive industrialists, national processive industrialists, n

gressive industrialists, patient money. The author was for many years director of public relations for Aluminum Company of America. Thus the portrayal comes from both a sympathetic and a well informed writer. The technical reliability is equally vouched for through the acknowledged cooperation of Junius D. Edwards who has been an associate director of Aluminum Research Laboratories for over 30 years. Also contributing substantially has been the collaboration of J. G. Taylor, a long-time editor of employee publications of Alcoa.

The value to many chemical engineers and executives in reading this work will be the stimulus often needed in surmounting the insurmountable. After reading in this book of episodes sprinkled throughout the history of this company, one would hardly dare to admit failure in his own current problems, which though difficult, are equally responsive to zeal and hard work.

Not the least significant of the stories in the volume are the discussions of the problems of public relations and government relations. Few companies have suffered like vicissitudes of official attack. Many will profit from reading of these and from learning of the approach which made possible the gradual correction of general public criticism, to the point that Alcoa is now a widely recognized agency of quite different character than has been portrayed by critics.

With all the sympathetic writing, the cast of leading characters who built and still dominate this company remain human and interesting.

Recent Books & Pamphlets

Subject Summary

Sulphur Comprehensive and authoritative roundup of the economics and technology of the sulphur and sulphuric acid industry. Charts, flow diagrams

acid industry. Charts, flow diagrams and tabular data substantiate and amplify the text. 12 pages.

Acetylene

Achievements of acetylene chemistry attained at the Institute of Organic Chemistry, Moscow, during the past 15 years. Complete English translation of a recent article which appeared in a Russian publication..

Electrical Conductivity Outline of the main phenomena which can be studied quantitatively in connection with the passage of electricity through gases at low pressures. Particular attention is paid to phenomena associated with glowdischarge. 99 pages.

Summarized inventory of more than 100,000 scientific and technical re-

ports resulting from the research and development programs of the U. S. military departments.

Oilseed

Metallurgy

Defense

Survey of the properties and uses of oilseed protein materials as available and as possibly adaptable to new industry applications. Made by Arthur D. Little for the Dept. of Agriculture. 119 pages.

Its treatment of basic principles makes this book suitable for engineering and science students. Current practical achievements in physical metallurgy serve as examples of fundamental principles. Numerous tables concisely present representative data on commercial alloys. 293

Pollution

Scientific methods that can be used to determine the extent and nature of air pollution. Chemical, physical, biological and tracer techniques. 16 pages.

Instrumentation

Eleven papers delivered at a recent conference sponsored by Carnegie Institute of Technology. Some subjects covered: noncontact gaging; an electronic control system for industrial control applications; methods for sorting mixed metals. 48 pages.

Energy Data

Production, consumption and use of fuels and electric energy in the United States in 1929, 1939, and 1947. A basis stattistical document for market studies.

Natural Gas

Complete annual resume on data regarding production, transmission and use, giving 1950 data.

How to Order

Reprint No. 185. Editorial Dept., Chemical Engineering, 330 West 42nd St., New York 36, N. Y. 25 cents.

"Progress of Acetylene Chemistry in U.S.S.R." Associated Technical Services, P. O. Box 271 East Orange, N. J. \$31.80.

'The Conduction of Electricity Through Gases.' Third edition. By K. G. Emeleus. John Wiley & Sons, 440 Fourth Ave., New York 16, N. Y. \$1.50.

"Technical Information Activities of the Department of Defense." Special Committee on Technical Information, Research and Development Board, Washington 25, D. C. Gratis.

Dept. of Agriculture Bulletin 1043. Superintendent of Documents, Washington 25, D. C. 30 cents.

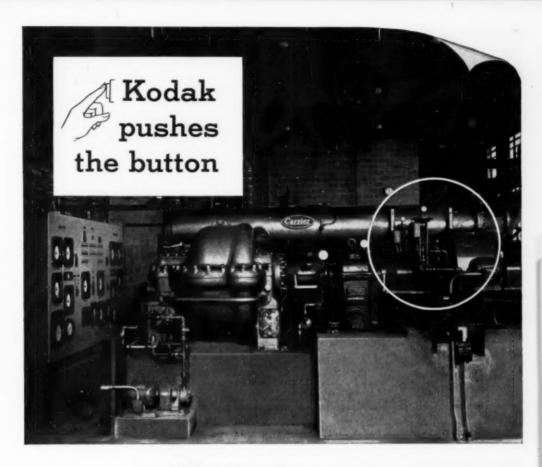
"Elements of Physical Metallurgy." By Albert G. Guy, Addison-Wesley Press, Inc., Cambridge 42, Mass. \$6.50.

"Air Pollution Abatement Manual," Chapter 7. Manufacturing Chemists' Assn., Woodward Bldg., Washington 5, D. C. 35 cents.

"Instrumentation for the Iron & Steel Industry." Instruments Publishing Co., 921 Ridge Ave., Pittsburgh 12, Pa. \$2.

RI 4805, Bureau of Mines 4800 Forbes St., Pittsburgh 13, Pa.

"Statistics of Natural Gas Companies." No. S-93, Federal Power Commission, Washington 25, D. C. \$3.75.



We do the rest...

in controlling the refrigeration system at Kodak's huge new Distribution Center at Rochester, N.Y.

This center handles practically every Rochester-manufactured Kodak product for storage, packing and shipping in its 476,000 square feet of floor space.

Air conditioning for storage of sensitive photographic films and papers is extremely important, and it starts off right with these 250-ton Carrier centrifugal compressors which supply the chilled brine to the Taylor controlled temperature zones . . "the most fully automatic compressors we ever installed", say Carrier engineers about these Taylor controlled centrifugals.

Taylor controls keep the output temperature of the chilled brine constant by regulating the oil volume in the hydraulic coupler (circled) between the compressor itself and a constant speed motor. During periods of minimum load, an ingenious hot gas by-pass induces a load on the compressors to eliminate surging and keep the system fully automatic. From Friday night to Monday morning, when the load is especially light, the system automatically keeps the brine temperature constant with no manual attention whatever.

No matter what your air conditioning or refrigeration problem may be, you'll get most efficient operation from your equipment when it's under Taylor Control. Ask your Taylor Field Engineer, or write for Cotalog 300. Taylor Instrument Companies, Rochester, N. Y., and Toronto, Canada.

Instruments for indicating, recording and controlling temperature, pressure, flow, liquid level, speed, density, load and humidity.

Taylor Instruments

ACCURACY FIRST

IN HOME AND INDUSTRY



You Can Help S-T-R-E-7-C-H

the supply of stainless pipe by specifying Schedule 5

Sure, Stainless Pipe is rough to get these days. But by

specifying LIGHT WEIGHT Schedule 5 you can help the mills almost double the supply

Here is the answer

Wherever you buy your Stainless Pipe, get all the facts about the strength and other technical advantages of LIGHT WALL Schedule 5 pipe. It weighs half as much as Schedule 40 pipe. It costs half as much. And it uses half the nickel and chrome because of its LIGHT WALLS. Yet, with all that, Schedule 5 Stainless Pipe is plenty strong enough to give you complete safety for working pressures up to 150 psi. In sizes under $1\frac{1}{2}$, working pressures can be considerably higher.

Before planning your next job "the same old way" with Schedule 40 pipe, talk to your steel distributor or producer. Consider taking full advantage of the strength of Stainless, by using LIGHT WEIGHT Schedule 5 Stainless Pipe.

And here's your chance—Call your Carpenter Stainless Tubing Distributor or write to us for this set of Data Sheets on Schedule 5 Stainless Pipe. They show why and how Schedule 5 offers all industry more Stainless Pipe for essential uses.



Carpenter

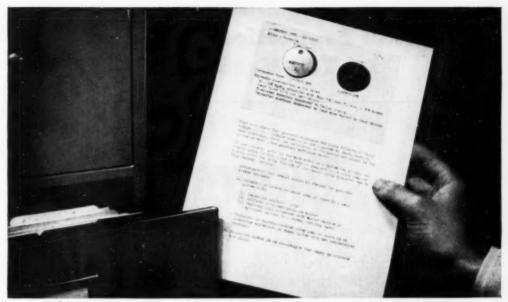
THE CARPENTER STEEL COMPANY
Alloy Tube Division, Union, N. J.

Export Department: Carpenter Steel Co., Reading, Pa.-"CARSTEELCO"

STAINLESS TUBING & PIPE



- guaranteed on every shipment



A CASE STUDY FROM THE WORTHINGTON FILES. This Worthington test sheet indicates that the galvanic action could be virtually eliminated in this manufacturer's system by insulation—that is, a complete september 1.

aration of the alloy pump from metallic contact with lead surfaces. The recommendation was made to him as a result of a Worthington test made on the solutions his system, was pumping.

It Takes More Than A Pump To Solve A Pumping Problem!

Worthington's files are packed with many stories like this one. Each is proof positive that you get a lot more than a Worthite* pump when you buy from Worthington.

It was the age-old problem of chemical pumping, corrosion. But this customer found a way out—a practical solution that saved him plenty of expense in extra maintenance and lost production time.

He wrote a letter to Worthington. Could we tell him whether there was anything he could do to slow down or stop this corrosion? He was pumping a 15% solution of sulfuric acid saturated with sulfur dioxide. Maximum temperature of solution was 150° F.

This wasn't a new problem for Worthington corrosion specialists. Experience had shown them that under these conditions galvanic action could be his trouble. They ran the test illustrated above which conclusively proved these assumptions correct.

Result? The customer insulated the system and his troublesome corrosion problem was brought under control.

At Worthington, we welcome the chance to hear about your pumping problems—either on a present installation or in the design of a new system. For it is only through such close contact with the industry that we can continue to build the kind of pumps and offer the kind of services that have led pump users the world over to the conclusion that there's more worth in Worthington.

Worthington Pump and Machinery Corporation, Centrifugal Pump Division, Harrison, New Jersey. *Reg. U. S. Pat. Off. C.1.6



Types CG and CGL Sizes %" to 10". Capacities to 5000 GPM: heads to 200 ft. Liquid



Type CF. Sizes 1° to 4° Capacities to 1000 GPM; heads to 130 ft. Standard, all iron and all



Type CQ. Sizes 15, to 3. Capacities to 600 GPM; heads to 130 ft. at 1750 RPM. Closed



Type L. Sises 3º to 8º Capacities to 2250 GPM: heads to 300 ft. Single stage volute. For general pervice.

The World's Broadest Line Assures You the Right Pump for Every Job



Centrifugal Pumps

What Properties in an Acid Do You Need Most?

Gluconic Acid is

☆ Non-corrosive!

Extensive laboratory tests have shown Gluconic to be the least corrosive of the mild acids.

☆ Non-toxic!

Other tests have demonstrated this acid's nea-toxicity. It is widely used in pharmaceutical preparations.

☆ An Effective Sequestering Agent!

Inactivates metallic contaminants. Keeps trace metals from precipitating out of solution.

These properties explain why Gluconic is a versatile acid. It is used widely as an ingredient of cleaning compounds, particularly those used for food and beverage equipment, and is effective in beerstone prevention. It is used in the textile industry as an acid catalyst for vat soluble ester printing pastes and as a sequestering agent to give sharper prints in dyeing operations. It is also used as a sequestering agent in tanning and in industrial water treatment.

Gluconic acid may be the mild, non-toxic acid you have been looking for. It may help improve your present processing operations or suggest new ones. Additional information is contained in Technical Bulletins Nos. 29 and 33. Write:

CHAS. PFIZER & CO., INC.

25 North Michigan Ave., Chicogo 11, 14. 605 Third St., San Francisco T., Calif.

Manufacturing Chemists

for Over 100 Years



Fron Natur Source	ral	From Chemical Synthesis
1%	DYES	99%
5	RESINS & PLASTICS	95
25	DRUGS & MEDICINALS	75
47	PAINTS, VARNISHES & LACQUERS	53
48	RUBBER	52
78	TEXTILE FIBERS	22
99	FOODS	. <1

Why Chemicals Keep Growing

A top industry executive recently said that our chemical production is "still in its infancy." That's the long-range look, all right. But is it justified?

Take the long-range look. Any such look will emphasize the fact that the chemical industry has grown, by and large, because it has been able to duplicate or improve on nature's products—and to do it economically.

The mobilization program, which has taken most of our attention these past eighteen months, has been a spur to chemical expansion.

But the vigor of the drive to boost productive facilities indicates the industry's deep-felt belief that expansion will not grind to a halt when the defense program is completed.

One of the reasons back of this belief is that chemicals—along with other industries—benefit from the rising U. S. population; this is now as much as 1.5 percent a year. And population growth alone may add 300 million pounds a year to the demand for synthetic organics.

▶ Other Causes Are Basic—But the basic function of the chemical industry has been to duplicate and to improve on materials which formerly were derived exclusively from natural sources. The industry often has a cost advantage because it usually works with resources—coal, air, water, oil. wood—which are in good supply.

The manufacture of dyes was one of the first industrial processes to reap the gains made possible by chemical advances. Before World War I dye producers were dependent on ship-

ments of natural or synthetic dyes from abroad.

Today, however, the chemical industry provides nearly all the required dyestuffs. And natural dyes have fallen away to a mere trickle. Barring an expansion of the entire dye industry, it is not likely that this field will involve any further growth for the chemical industry.

Synthetic resins and plastics now overshadow the once-dominant natural resins such as shellac. The United States imports annually about 100 million pounds of natural gums and resins. But this represents only a small fraction of the 2.5 billion pounds of resins and plastics produced here in 1951.

Synthetic pigments have made great gains in the paint, varnish and lacquer industry. More than 50 percent of the 500 million gallons of paint produced each year in the United States is derived from synthetics. But chemical gains in this field are still far from complete.

Synthetics on the Rise-During the past decade the chemical industry has made great strides in the field of drugs and medicinals. Fully 75 percent of our total output is now produced by chemical synthesis. However, the drug industry still relies heavily on biological and botanical sources for many products. And since there seems to be no limit in sight to the

zooming demand for drugs, additional chemical expansion in this field is cer-

The impact of mobilization sent synthetic rubber output soaring. At present 50 percent of national rubber needs are met by synthetic producetion. But synthetic producers have obstacles to hurdle before they can permanently displace natural supplies. Natural rubber—in peacetime—is very cheap. And for a few items the synthetic products can't quite yet duplicate the performance of natural rubber.

It would be a mistake, however, to write off the growth prospects for the synthetic rubber industry. Natural sources of supply are so far from the continental United States—and easily overrun by aggressors with military strength in Asia—that geography alone will prod the industry into making further technical advances.

Synthetic detergents have made great gains since 1940. The 1951 production level of well over a bilion pounds represents a far cry from the 50 million pounds of 1940. The current record still falls far short of soap production—but the detergent rage has not yet spent its fury. Industry spokesmen expect demand to sanction a doubling—perhaps a trebling—in the production of synthetic detergents within the near future.

Clothes and Food—The total production of synthetic fibers is almost 1.5 billion pounds. Rayon output alone accounts for well over a billion pounds. Further growth is certain. The newer synthetics—Orlon, Acrilan, Dacron, Vicara and Dynel—are just beginning to take hold.

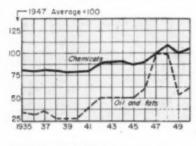
Several of these new fibers are aimed at the wool market. Dynel, Vicara, Orlon and Dacron blend or substitute well for wool and they are cheaper. And the price is expected to go even lower when volume production really gets underway.

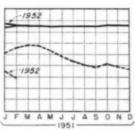
The food industry has hardly been dented by chemicals. It seems certain that chemical producers will be called on to help boost output of fertilizers, insecticides, weed killers and growth stimulants. And the use of flavors, colors, preservatives and other food-upgrading chemicals is certain to rise in the long run.

For the foreseeable future, then, the growth forecast for the chemical industry arises from its ability to synthesize products that meet the needs of American industry.

Process Industry Trends

PRICES =

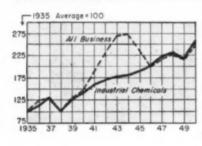


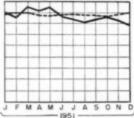


Chemical Engineering's Price Indexes

	Chemicals	Oils & Fota
As of Feb. 1, 1952	120.74	61.75
Lest month	121.62	68.28
February 1951	118.98	97,69
February 1950	98,94	51.21

CONSUMPTION:

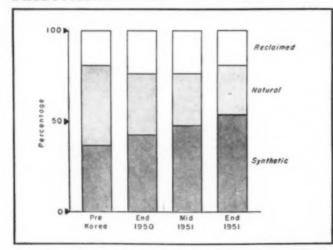




Industrial Chemicals	Index		
	Dec. (Esr.)	Nov. (Prolim)	Oct. (Revised)
INDEX	248,70	257.42	267.24
Fertilizer		56.58	54.44
Pulp and paper		29.86	31.49
Percelyum refining		25.96	26.14
from and steel		16.13	16.68
Reyon		28.05	29.41
Glass		16.32	21.61
Point and warnish		23.08	27.10
Textiles		10.93	10.11
Cool products		11.09	11.39
Leather		3.54	3.62
Explosives		9.96	9.92
Rubber		5.92	6.52

18.83

PRODUCTION =



Synthetic Now Accounts for More Than Half

place in the types of rubber consumed. At the end of 1951, synthetic share was only 35 percent of the total.

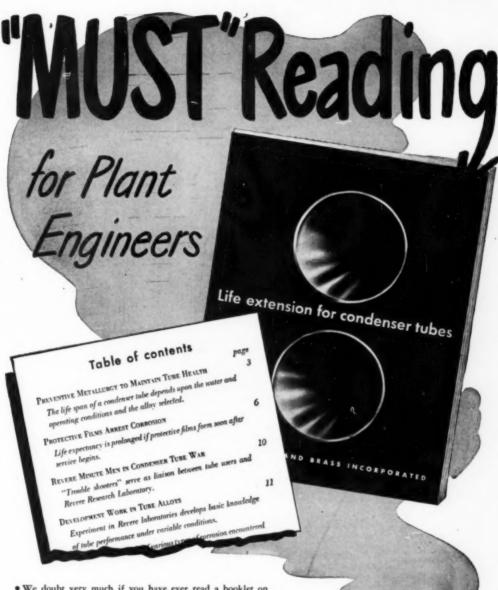
Since Korea a big shift has taken rubber accounted for about 53 percent

Under pressure of the defense effort, World War II plants were placed on stream to produce the necessary chemicals for synthetic rubber. Additional plants were tuned up to turn out larger quantities of synthetic. But natural rubber is still necessary for many rubber items.

The importance of natural rubber has declined since Korea. At that time it accounted for about 46 percent of the total. Currently it has narrowed to little more than a quarter. But imports of natural continue at fairly high levels, despite the fact that many of the areas from which the United States imports rubber are faced with threats of Communism. And some of the natural still goes into the stockpile.

Immediately after Korea, reclaimed rubber consumption rose. By the end of 1951, reclaimed only accounted for about 19 percent of the total-same as pre-Korea.

Now is the time for rubber manufacturers to get their plants in shape to use synthetic. As long as the defense effort continues, synthetic rubber will be king.



 We doubt very much if you have ever read a booklet on Condenser Tubes, quite like this one.

Plant engineers should find it of unusual interest particularly with present restrictions on copper and its alloys making it more important than ever that every last ounce of use be squeezed out of the condenser tubes in their plants.

This 28-page booklet includes data on various copper alloys, photos of cut-away tube sections showing various types of corrosion encountered in condenser tube service and photomicrographs showing the grain structure of different kinds of metals under varying operating conditions.

Send for your copy today. Please make request on your firm's letterhead. Thank you. Address Department P.R., Revere Copper and Brass Incorporated, 230 Park Avenue, N. Y. 17, N. Y.

REVERE COPPER AND BRASS INCORPORATED

Founded by Paul Revere in 1801 230 Park Avenue, New York 17, N. Y.

Mills: Baltimore, Md.; Chicago and Clinton, Ill.; Detroit, Mich.; Los Angeles and Riverside, Calif., New Bedford, Mass.; Rome, N. Y.— Sales Offices in Principal Cities, Distributors Everywhere

SEE "MEET THE PRESS" ON NBC TELEVISION EVERY SUNDAY

New Construction

Proposed Work

- Ga., St. Marys—St. Marys Kraft Corp., St. Marys, Ga. plans to construct sulphate pulp and kraft mill additions. Estimated cost \$1,350,000.
- Okla, Blackwell—Cities Service Oil Co., 70 Pine St. New York, N. Y. plans to construct combination butane-propane plant at Blackwell, Oila Estimated cost \$3,880,000.
- Okla, Ponca City—Continental Oil Co., Ponca City, plans to construct lubricating oil plant, here Estimated cost \$7,500,000.
- Pa., Harrisburg—Central Iron & Steel Co., South Front St., Harrisburg, Pa., plans to construct blast furnace, 2 open hearths, coke ovens and chemical recovery plant, here. Estimated cost \$30,000,000.
- Tex., Beaumont—Magnolia Petroleum Co., Magnolia Bldg., Dallas, Tex., plans to construct gasoline reduction plant, here. \$5,500,000
- Tex., Corpus Christi—Pontiac Refining Corp., 3400 Lawrence St., Corpus Christi, Tex., plans aviation gasoline refinery unit. \$2,000,000
- Tex., Daingerfield Longhorn Ordnance Works, Daingerfield, Tex., plans to construct plant for rocket fuel manufacture, near here. Estimated cost is over \$1,000,000.
- Tex., Houston-Warren Petroleum Corp., City National Bank Bldg., Houston, Tex., plans to construct gas plant and allied facilities, here. Estimated cost over \$1,000,000.
- Tex., LaPorte—E. I. du Pont de Nemours & Co., Inc., LaPorte, Tex. plans to construct fungicides manufacturing plant here. Estimated cost \$3,500,000,
- Tex., Odessa—Phillips Chemical Co., Bartlesville, Okla. plans to construct elemental sulphur production plant, here. Estimated cost \$1,741,000.
- Tex., Orange—Solvay Process Division of Allied Chemical & Dye Corp., 61 Broadway, New York, N. Y. plans to construct additional chemical plants. Estimated cost \$10,000,000. Also plant to manufacture ethylene glycol and ethylene oxide. Estimated cost \$8,000,000.
- Tex., Texas City—Republic Oil Refining Co., Texas City, Tex., plans to construct crude distillation refinery. Estimated cost \$3,550,000.
- W. Va., Moundsville—Solvay Process Division, Allied Chemical & Dye Corp., 61 Broadway, New York, N. Y. plans to construct chlorine caustic soda plant, with mercury cell process. Estimated cost \$15,000, 000.
- C., Vancouver—Celgar Development Co., c/o Celsnese Corp. of America, 180 Madison Ave., New York, N. Y. plans to construct wood palp and newsprint development, near Castlegar. Estimated cost \$65,000,000.

	Proposed Projects		Cumulative 1952	
	Work	Contracts	Proposed Work	Centracta
New England Middle Atlantic South Middle West West of Missensippi Far West Canada	\$20,000,000 16,350,000 47,671,000	\$25,000,000 28,545,000 54,826,000 60,920,000	\$30,000,000 153,865,000 17,900,000 176,598,000 3,000,000 65,000,000	\$1,000,000 24,082,000 28,745,000 51,700,000 94,498,000 2,940,000
Total	\$159,021,000	\$169,291,000	\$446,363,000	\$202,965,C00

Contracts Awarded

- Ala., Mobile—Colabama Chemical Co., Huntsville, Ala., will construct plant, here. Owner Builds. Estimated cost \$200,000.
- Pla., Nichols—Virginia-Carolina Chemical Corp., 401 E. Main St., Richmond, Va. awarded contract for chemical plant te Chemical Construction Co., 488 Madison Avc., New York, N. Y. Estimated cost \$250,000.
- Ga., Doctortown—Rayonier, Inc., 122 East 42 St., New York, N. Y., will construct new pulp mill to produce cellulose. Work will be done by owners. Estimated cost \$25,000,000.
- III., Chicago—Acnie Resin Co., 1401 Circle St., Fort Park, III., awarded contract to design and construct factory, here to H. K. Ferguson, 1 North LaSalle St., Chicago, III. Estimated cost \$260,000.
- III., Chicago—Allied Chemical & Dye Corp., Barrett Division, 40 Rector St., New York, N. Y. awarded contract to Fitzsimmons & Connell Dredge & Dock Co., 10 South LaSalle St., Chicago, III., for phthalic anhydride plant, here. Estimated cost \$5,000,000.
- Ill., Tuscola—National Petro-Chemicals Corp., Tuscola, Ill., has awarded contract for plant to extract butane, propane and ethyl chlorine from natural gas to J. F. Pritchard & Co., 908 Grand Ave., Kansas City, Mo.; Lummus Co., 385 Madison Ave., New York, N. Y., and to Vulcan Supply Co., 120 Sveamore St., Cincinnati, O. Estimated cost \$338,000,000.
- Ind., Charleston—U. S. Engineers, Louisville, Ky., awarded contract to rehabilitate and operate Indiana Ordnance plant to manufacture smokeless powder to E. I. du Pont de Nemours & Co., Inc., Wilmington 98, Del. Estimated cost \$8,966,000.
- Ind., Peru—D & K Fertilizer Co., West Peru, Ind., awarded contract fertilizer factory to Jones Construction Co., Logansport, Ind. Estimated cost \$400,000.
- Kan., El Dorado--Eldorado Refining Co., El Dorado, Kan., awarded contract for refinery to Refinery Engineering Co., Wright Bidg., Tulsa, Okla. Estimated cost \$3,500,-000.
- Kan., Phillipsburg—Consumers Cooperative Association, Phillipsburg, Kan., awarded contract catalytic and polymerization cracking refinery to Refinery Engineering Ca., Wright Bldg., Tulsa, Okla. \$2,750,000.
- La., Lake Charles-Columbia Southern Chemicals Corp., Lake Charles, La., awarded

- contract plant additions to T. Miller & Sons, P. O. Box 921, Lake Charles, La. Estimated cost \$95,000.
- La., Westlake—Continental Oil Co., Westlake, La. awarded contract for refinery No. 3 addition to Port City Construction Co., P. O. Box 22, Lake Charles, La. Estimated cost \$3,000,000.
- Mich., Wyandotte.—Pennsylvania Salt Manufacturing Co., Wyandotte, Mich., awarded contract for synthetic anhydrous ammonia plant here to Foster-Wheeler Corp., 165 Broadway, New York, N. Y. Estimated cost \$2,200,000.
- N. Y., Waterford—General Electric Co., River Road, Schenectady, N. Y. awarded contract for silicone plant addition to United Engineers & Constructors, Inc., 1401 Arch St., Philadelphia, Pa. Estimated cost \$5,000.000.
- Okla., Drumright.—Tidewater Associated Oil Co., Drumright, Okla., awarded contract for crude oil distillation unit to Born Engineering Co., 408 North Boston St., Tulsa, Okla. Estimated cost \$1,650,000.
- Pa., Marcus Hook—Sun Oil Co., 1608 Walnut St., Philadelphia, Pa. will construct aromatics plant, here. Owners will construct. Estimated cost is \$20,000,000.
- Tex., Gregory—Revnolds Metals Co., 3rd and Grace Sts., Richmond, Va., awarded contract alumina plant to C. F. Braun & Co., 1000 South Fremont Ave., Alhambra, Calif. Estimated cost \$42,000,000.
- Tex., Houston—Phillips Chemical Co., Bartlesville, Okla., will construct plant to make pyridine, here. Owner builds. Estimated cost \$2,500,000.
- Tex., Port Arthur—Gulf Oil Corp., Port Arthur, Tex., awarded contract sulphuric acid plant to Leonard Construction Co., 37 South Wabash St., Chicago 3, Ill. Estimated cost \$1.750.000.
- Tex., Smiths Bluff—Pure Oil Co., Smiths Bluff, has awarded the contract for a 20,000 bbl. daily capacity vacuum flash refinery unit to M. W. Kellogg Co., Esperson Bldg., Houston. Estimated cost \$1,750,000.
- Tex., Sunray—Shamrock Oil & Cas Co., Esperson Bldg., Houston, Tex., awarded contract design and construct continuous cook contact method refinery, here to Lummus Co., Esperson Bldg., Houston. Estimated cost \$2,250,000.
- Tex., Texas City.—Carbide & Carbon Chemicals Co., Texas City. Tex., will construct polyethylene plastic resin plant here. Owner builds. Estimated cost \$3,350,000.



LADISH

Controlled Quality

PIPE FITTINGS

LADSH WAR O ANT



...where flow efficiency is a vital factor

You can depend on Ladish Controlled Quality Fittings to maintain maximum flow characteristics of any piping system... and do it consistently year after year. For advanced Ladish engineering assures the true circularity, full effective radii and smooth inner surfaces necessary to keep turbulence and friction loss at a minimum... features which are doubly safeguarded by the high, inflexible standards of Ladish Controlled Quality.

THE COMPLETE Controlled Quality FITTINGS LINE PRODUCED UNDER ONE ROOF...ONE RESPONSIBILITY

LADISH CO.

CUDAHY, WISCONSIN

Dishirct Offices, New York + Buffolo + Pérsburgh + Philadelphia + Cleveland + Chicago + St. Pc St. Louis + Atlanta + Houston + Tulsa + Los Angeles + Movana + Toronto + Mexica City

61210=020:47.0000

Partial List of WHAT WE MAKE

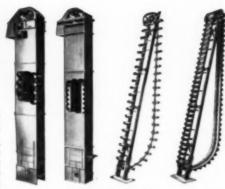
TO HELP YOU IN YOUR HANDLING AND PROCESSING OPERATIONS



BELT CONVEYORS - IDLERS

Check these items . . . likely you need one or more right now. We build a complete line of equipment for handling, processing and

reducing all kinds of material. We cannot show everything Jeffrey builds to speed production and cut costs, but send for Booklet No. 832 for a quick picture of our extensive line. Jeffrey's engineering facilities are available for laying out complete handling and processing systems or the application of individual units.



BUCKET ELEVATORS





SCRAPER CONVEYORS

For handling bulk material horizontally or on incline, discharging at fixed point through valves in trough bottom. Also wood or steel Apron Conveyors.



CHAINS **SPROCKETS ATTACHMENTS**



A wide range of sizes and types in electric vibrating feeders, conveyors, screens, packers, etc. Absolute control over tennage



BARREL PACKERS

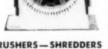
for economy in packing operations—reduce size of container, increase its capacity and cut shipping costs. Also conveyortype packers and packing tables.

> Complete Line of Material Handling, Processing and Mining Equipment

M-V MECHANICAL VIBRATING CONVEYORS

For conveying abrasive, lumpy or rough materials, hot or cold, dry or wet, as well as fine materials. Up to 80' can be operated by one drive unit. Also electric vibrating conveyors, feeders, screens and packers.





CRUSHERS - SHREDDERS **GRINDERS — PULVERIZERS**

MANUFACTURING COMPANY Established 1877

909 North Fourth St., Columbus 16, Ohio

Battimore 2 Beckley, W. Va. Birmingham 3

Chicago I

Detroit 13 Forty Fort, Pa. Harlan, Ky.

Jacksonville 2 Milwaykee 2

Philadelphia 3 Pittsburgh 22

St. Louis 1 Salt Lake City 1

The Gollon from Works & Affig. Co., Gollon and Bucerus, Ohio Gollon (Greet Berhan 1st). Workefield, England A.A.
The Kilbourne & Jacobs Mfg. Co., Columbus, Ohio

Teffrey Mfg, Co. Ltd. Montreal, Canade British Jeffrey-Diamond Ud. Wakefield, England Jeffrey Golian Pty., Ltd. Johannesburg, S. A.

IDEA-CHEMICALS

... from Du Pont Polychemicals Department

"LOROL"* 5 FATTY ALCOHOL produces a better detergent at a lower cost

To improve detergency, yet keep costs down, a shampoo manufacturer decided to make his own detergent. He took Du Pont "Lorol" 5, sulfated it to lauryl sulfate. This gave him a uniform, economical product—in fact, he considers it "the one superior detergent for shampoo." Now he also uses this lauryl sulfate as a wetting agent in some of his other products.

The ability of "Lorol" 5 to be esterfied, or to be oxidized to aldehydes, makes it a profitable chemical for other industries, too—for example, as an intermediate in making pharmaceuticals, synthetic rubber and textile softening agents. And new applications are suggested as an ingredient in metal polishes, a softener and tackifier in adhesives, an



intermediate in making insecticides.

Your business may find opportunities for profitable uses in "Lorol" fatty alcohols (Du Pont makes six in all)... or in many of the other Polychemicals Department products. There are more than 100 of them—organic acids, amides, esters, resins, solvents and plastics.

Write for technical booklet on Polychemicals products for your industry

Technical bulletins on "Lorol" 5 and the chemicals and plastics used in your industry are available. Each product bulletin in the booklet presents physical and chemical properties, description, specifications, uses and possible applications, bibliography and other data. Write us on your business letterhead for your copy—and please tell us the nature of your business or type of application that you have in mind.

E. I. du Pont de Nemours & Co. (Inc.)
Polychemicals Department, 152E Nemours Building
Wilmington 98, Delaware

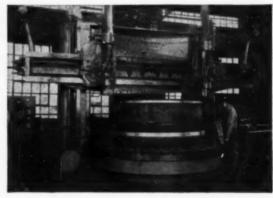


HOW 161/2 ACRES STAND BEHIND

100,000 gals.



Posey Iron is equipped to do the complete job...from helping you determine correct type and size straight through to stress relieving, x-raying, pickling, painting and erection. The facilities of two large plate shops, an up-to-the-minute machine shop and a large foundry eliminate needless delays. Posey fabricates to meet both standard and special requirements in tanks up to all capacities. Write today for free 12-page reference bulletin.



This 16'6" vertical boring mill is one of the many tools recently added to Posey Iron's machine shop. This shop is fully equipped for the diversified machining operations demanded by Posey's different divisions.

Posey Iron's 16½ acres of modern plant (under roof) stood behind the prompt delivery and sound construction of this 100,000 gallon elevated tank. Forty-one years of Posey Iron experience helped assure dependable engineering and design.

PARTIAL LIST OF PRODUCTS

Tenks
Dredge Pipe

Digesters
Stocks

Pressure Vessels
Gas Holders

Kilns
Stills

General Steel Plate Fabrication

POSEY IRON WORKS, INC.

Steel Plate Division

LANCASTER, PA.
New York Office: Graybar Building

New York Office: Graybar Buildii
ESTABLISHED SINCE 1910





Outstanding physical and chemical characteristics of Nalco ion exchange materials provide excellent opportunities for development of new processing uses—as well as for maximum utilization of conventional ion exchange techniques. Here are quick facts on three of the Nalco ion exchange materials:

Nalcite HCR

CATION EXCHANGE RESIN

Styrene type cation exchange resin for fast efficient removal of metal ions from water and a wide variety of process liquids. Either salt or acid regeneration. High operating capacity (Up to 32,000 grains per cubic foot) with no capacity loss at high temperatures (Up to 250° F) or over the entire pH range.

Nalcite SAR

STRONGLY BASIC ANION EXCHANGE RESIN

For substantially complete removal of all acid-radical constituents from water and processing liquids. Operates efficiently over a wide pH range (2.0 to 10). Microspheres of uniform size range.

Nalcite WBR

WEAKLY BASIC ANION EXCHANGE RESIN

A new polystyrene-polyamine type anion exchanger of high chemical stability. High capacity for removal of the stronger acids makes Nalcite WBR particularly applicable for demineralization techniques. Supplied in bead form.

NATIONAL ALUMINATE

6236 West 66th Place Chicago 38, Illinois

Canadian inquiries should be addressed to Alchem Limited, Burlington, Ontario, Canada More Data on any or all thatis ion an change materials will be furnished grouptly upon request. Nates Laboratory and Engineering facilities evoluble for specialized ion authorize research, and development.

Halco

PRODUCTS . . . Serving Industry through Practical Applied Science

A Statement by Anaconda on the Copper Situation

MANY users of copper have vital decisions to make . . . usually in connection with the present defense-induced shortages of copper and aluminum. This statement is an effort to remove the smoke screen surrounding the copper picture . . . to wipe away the confusion caused by too much talk supported by too few facts.

Substitution poses problems — Industry has been urged to substitute aluminum and other materials for copper. In some instances this may be logical and practicable. In many others it is difficult, if not impossible. But — before making *any* long-term decisions that may cost a great deal of money in engineering, new plant facilities or rescheduling of production operations — one should know the facts about the future of copper.

New Anaconda projects — The first major increase in copper production will come from Anaconda when the Greater Butte Project and the new Sulphide Plant at Chuquicamata, Chile, begin operations this spring. By 1953, these two projects should raise present levels of copper production by about 95,000 tons yearly.

Toward the close of 1953, Anaconda's new

Yerington project in Nevada is expected to start producing at an annual rate of 30,000 tons. By then, Anaconda will be adding to the present yearly copper supply at the rate of about 125,000 tons.

Other new projects — During 1954-55 still other new projects in the U. S. and friendly foreign countries will further augment the increasing copper supply. All told, it is estimated that by 1955, not less than 450,000 tons of copper could be produced annually — over and above present production levels.

Accordingly, in 1955-56, domestic production plus imports could bring the U. S. copper supply to 1,800,000 tons yearly. This would represent an increase of about 20% over present levels. Based on historical comparisons, and barring a large-scale shooting war, this amount of copper could support a Federal Reserve Board Index of Industrial Production of 270, an increase of 24% over the present, and 45% above the first half of 1950.

These are the 'things to come' in copper. On the basis of the facts there is no necessity for considering long-range substitution of other materials for the red metal.

ANACONDA
COPPER MINING COMPANY

The American Brass Company
Anaconda Wire & Cable Company
International Smelting and Refining Company

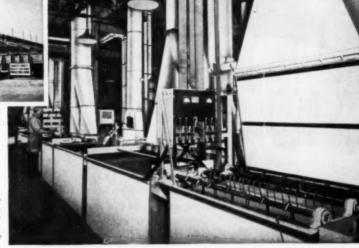
Andes Copper Mining Company Chile Copper Company Greene Cananea Copper Company

PRODUCERS OF: Copper, Zinc, Lead, Silver, Gold, Cadmium, Vanadium, Superphosphate, Manganese Ore, Ferromanganese, MANUFACTURERS OF: Electrical Wires and Cables, Copper, Brass, Bronze and other Copper Alloys in such forms as Sheet, Plate, Tube, Pipe, Rod, Wire, Forgings, Stampings, Extrusions, Flexible Metal Hose and Tubing.

FUME CONTROL



General exhaust of an entire building where fumes are generated.



Exhaust system consisting of hoods, piping and fans, for collection of fumes and vapor at point of generation.

Improves Working Conditions Eliminates Fire Hazards Lowers Maintenance Costs

Proper fume control can eliminate fire or explosion hazards, improve employee health and morale through better working conditions, and lower maintenance costs. To help solve your fume control problem, Sturtevant has a wide background knowledge based on a variety of applications in many industries.

The systems pictured are equipped with Sturtevant fans (1) to collect and exhaust explosive fumes that result from processing operations dispersed throughout a general area, or (2) to carry off injurious vapors where

individual operations generate corrosive or injurious smoke and fumes within a confined area. Whatever the application, Sturtevant can provide fans, exhausters and air handling apparatus to handle fume problems in your plant.

To obtain complete information on your problem, contact your local Sturtevant office, or write to Westinghouse Electric Corporation, Sturtevant Division, Hyde Park, Boston 36, Massachusetts.

YOU CAN BE SURE ... IF IT'S

estinghouse

J-802018

PUTTING



AIR HANDLING UNITS



OWORK

INDUSTRIAL FANS



AXIAL FLOW FANS







Most foundries have equal access to equipment and raw materials but their products can be a long ways apart in quality. The difference can usually be summed up in one word . . . experience.

For over 42 years Sivyer has specialized in high alloy and specification steel castings. This accumulated "Know-how" can serve you in solving your special steel casting problems . . . in providing castings designed to lower your machining time, eliminate flaws and provide longer more dependable service life.



SHAFER

SPECIALISTS IN HILL ALLOY AND

SPECIFICATION STEEL CASTINGS

SIVYER STEEL CASTING COMPANY . MILWAUKEE SCHICAGOS

PICCO

Synthetic

RESINS

Dependably serving a wide variety of industries and applications

COLYTE

A pure hydrocarbon, pale, non-yellowing, thermoplastic terpene resin that is low in cost, soluble in low cost naphthas, chemically inert, compatible with waxes, resins, paint and varnish oils and many other materials. Available in nine melting points.

OUMARON

A series of thermoplastic para-coumarone indene resins, soluble in coal tar, turpentine, terpene and most chlorinated solvents. Ten melting points, from liquid to a brittle solid. Inert to all except strong concentrated acids.

PICCOLASTIC

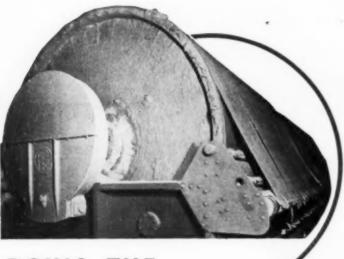
Made in six types and seven melting points, from 5° C. to 150° C. Pale in color, Piccolastic Resins are unsaponifiable, stable in package, body and film, soluble in low-cost solvents, acid and alkali resistant. Permanently thermoplastic.

PENNSYLVANIA INDUSTRIAL CHEMICAL CORP.

Clairton, Pennsylvania

Plants at

CLAIRTON, PA.; WEST ELIZABETH, PA.; and CHESTER, PA. Distributed by Pennsylvania Falk Chemical Co., Pittsburgh 30, Pa. and Harwick Standard Chemical Co., Akron 5, Ohio



DOING THE IMPOSSIBLE... Continuously

WITH FEInc STRING FILTERS

This job looked hopeless. The sticky, clay-like material plugged-up scraper-type filters after less than two revolutions. Continuous filtration seemed impossible. Plans were made for using a more expensive, non-continuous drying process.

Then a FEinc engineer suggested a trial run on a String Discharge "Pilot Plant" filter—available on a rental basis for just such experiments. Results were beyond expectations. The "impossible" filter cake left the cloth and discharge strings cleanly, with no plugging or blinding of the cloth, gave really continuous filtration. Three full-size FEinc filters are now handling this "impossible" material, give same high efficiency as Pilot Plant unit.

Find out how FEinc can save on your job. Send us a five-gallon sample of slurry. We'll run tests in our laboratory, give you a report on costs and performance. Or if you wish, we can run these tests in your own plant, without interrupting your production. No obligation, of course.

Send for free filtration bulletin 103.

THE CAKE THAT COULDN'T BE FILTERED...

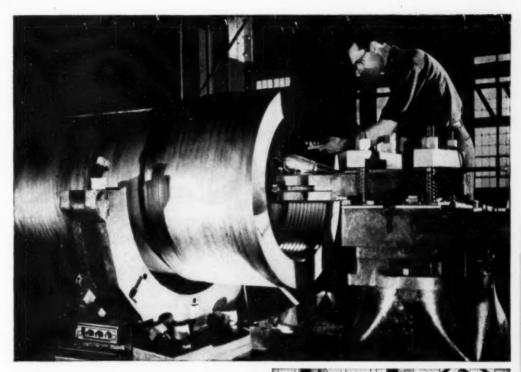


. . . drops cleanly from the string discharge of a FEinc filter. Where required, special cake-scoring devices can be used, or the cake may be fed—still supported by strings—through steam dryers and other special units.



FILTRATION ENGINEERS INC.

155 ORATON STREET . NEWARK 4, NEW JERSEY



You can Trust Them



Bethlehem forged steel pressure vessels are among the world's most carefully-made products.

The steel is subject to close controls before it ever reaches a forging press. Once approved, it is forged, ,heat-treated, and machined by men who know every last detail of their jobs. As the vessel takes shape, all operations are closely followed by Bethlehem's metallurgical staff.

Bethlehem can build your vessel in virtually any size or type, and with almost any desired wall thickness. It can be built to single-unit or multiple-unit design, whichever best suits your needs. You can trust it to do the job intended; it is a product expertly made, checked and double-checked every step of the way.

If you are planning new vessels, why not call us? Our engineers will be glad to study your requirements and co-operate in every way possible.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.
On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast
Steel Corporation. Export Distributor: Bethlehem Steel Export Corporation



Bethlehem FORGED-STEEL PRESSURE VESSELS



KOVEN FOR INDIVIDUALIZED CHEMICAL EQUIPMENT SINCE 1881

NOW...THE STRONGEST PART OF ALLOY PIPING SYSTEMS!

New Key-Kast

ALLOY STEEL WELDING PIPE FITTINGS

ALL SHAPES ... S



LONGER LIFE BUILT IN!



- Greater Wall Thickness Throughout—for Increased Structural Strength.
- Extra Thickness in Critical Areas—for Greater Allowance Against Corrosion and Erosion.

PROMPT DELIVERIES! Wire or write for information and prices on your alloy welding fittings today!

Key Company

P. O. BOX 494-B . EA

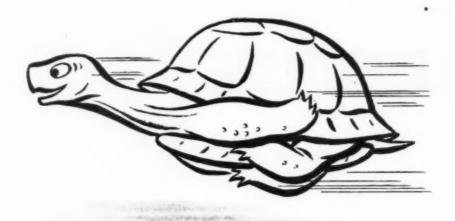
Since 1916 . . . Pioneers in ing Products for High R

DISTRICT OFFICES: NEW YORK C

CLEVELAND

CHEMICAL ENGINEERING-February 1952

387



SPEED ADVANCEMENT

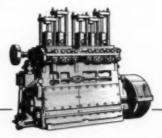
Aldrich did it with Direct Flow Pumps

Not too long ago, 150 rpm was considered high speed operation for reciprocating pumps. But today—as a result of improved design and stronger metals—Aldrich Direct Flow Pumps are operating efficiently at or over speeds of 500 rpm for the 3", 360 rpm for the 5", and 300 rpm for the 6" stroke unit. This increase in speed means simply this:

You get more work—greater pressure and volume—out of a smaller pump. You invest in a lighter, lower cost unit . . . a pump with a sectionalized fluid-end that's extremely easy to maintain and which can be made of stainless steel, bronze, Monel or other special material, as desired.

Applications include handling of caustic solutions, fatty acids, nitric acid, acetic acid, aqua ammonia, anhydrous ammonia, also liquids encountered in petroleum refining, petro-chemical and other industries.

Request Data Sheets on 3", 5", or 6" Stroke Pumps for complete information.





PUMP COMPANY

3 GORDON STREET . ALLENTOWN, PENNSYLVANIA

...Originalors of the Direct Flow Pump

Representatives: Birmingham « Bolivar, N. Y. « Boston » Buffolo « Chicago « Cincinnell » Claveland » Derver » Detroit

Dulatifi « Houston » Jacknonville « Los Angeles » New York » Omaha » Philadelphia » Pittsburgh » Portland, Ore.

Richmond, Va. « St. Louts » San Francisco » Saettle » Spokane, Wash. « Syracuse » Tulsa » Export Dept.: 751 Drexel Building, Phila, 6, Pa.



(ELECTRONIC WEIGHT CONTROL)

Remote, Instantaneous,
Dial-Control Formula
Changing and
Ingredient Selection

Multiple ingredients from feeders

For Proportioning Applications

Select-O-Weigh, Richardson's electronic weight control system, reduces the most complex formula-changing and ingredient-selection problem to push-button simplicity. For with Select-O-Weigh you select, measure, and deliver up to twelve ingredients from a single, pre-set, remote-automatic control panel.

Through incorporation of a simple, fool-proof electronic circuit, Select-O-Weigh changes formulas instantly, with the setting of a dial-no sliding poise adjustments or manual weight changing. And a single, automatic scale handles many ingredients—up to twelve or more.

Select-O-Weigh is designed for either cumulative or consecutive weighing, and can be used with many existing automatic scales. Richardson E-30 Automatic Bulk Scale set up for operation with the Select-O-Weigh. Discharge from E-30 would be through happer to next operation on floor below. Batch hopper capacity to suit



Control panel for Select-Q-Weigh handling constantly verying amounts of a single material Weight desired is set on control dial, and compensation on smaller vernier knob below it. Multiple control dials for multiple ingradients.

The Richardson Scale Company, Clifton, N. J., will be glad to supply information on:

Feeder-Weigher Systems

Automatic Bulk Weighing Hopper Scales

Automatic Bulk Weighing Hopper Scales

Bay Sewing Conveyors

Packers

Process Control Panels and Select-O-Weigh

Please write direct to our Clifton office, or to the nearest of our branch offices, located in Atlanta, Boston, Detroit, Minneapolis, Cincinnati, Wichita, Montreal, Omaha, New York, Pittsburgh, San Francisco, Toronto, Buffalo, Chicago, Philadelphia, Houston.

Write for Select-O-Weigh Bulletin #0351.



Richardson

6 8100

CHEMICAL ENGINEERING-February 1952

389

Dissolve your process problems with ROOSEVELT solvents



Every product you see here has one thing in common . . . each uses a

Roosevelt aliphatic naphtha at some time during its manufacture or use. In
many cases a specific process problem had to be solved . . . sometimes by
the selection of a standard Roosevelt solvent . . . sometimes through the
use of a special solvent, specially produced to the manufacturers' specifications.

As you can see Roosevelt solvents have wide application. Does your product fit into the picture? It does if you need an aliphatic naphtha solvent. If the solvent you need isn't "standard" at Roosevelt, we'll make it for you. Submit your specifications.





Write for your copy of Roosevelt's book of specifications. It's yours for the asking.



make every bit of stainless count

Wise and efficient use of available stainless steel stocks can go a long way to making sure that all defense and industry needs are met.

Getting the best available materials for your job is a vital first step—Crucible, pioneers in the development of stainless steels, urges you to take full advantage of our metallurgical staff and stainless fabricating specialists. Their wealth of experience—based on thousands of stainless applications—can help stretch your stainless supply. There is no other metal that can work the same "miracles" as stainless, and these Crucible metallurgists can help you select the best available stainless grades for your needs.

It's up to you to make every bit of stainless count—we're equipped to help you do it. When your problem is stainless—call on us.

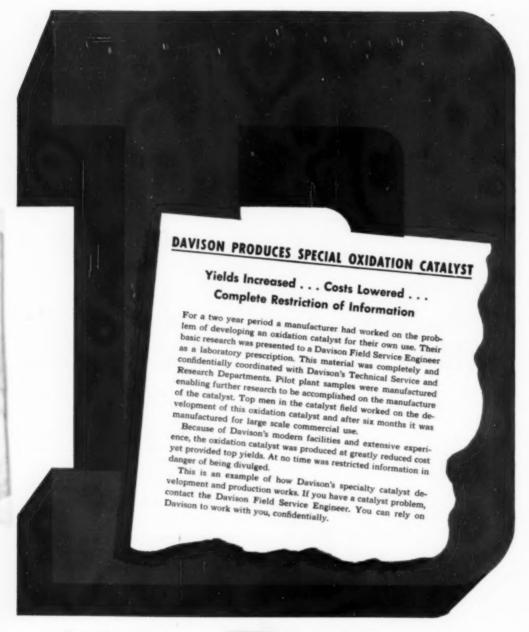
CRUCIBLE

first name in special purpose steels

52 years of Fine steelmaking

STAINLESS STEEL

CRUCIBLE STEEL COMPANY OF AMERICA, GENERAL SALES OFFICES, OLIVER BUILDING. PITTSBURGH, PA.



Progress Through Chemistry

THE DAVISON CHEM



AL CORPORATION

Baltimore 3, Maryland

PRODUCERS OF: CATALYSTS, INORGANIC ACIDS, SUPERPHOSPHATES, PHOSPHATE ROCK, SILICA GELS, SILICOFLUORIDES AND PERTILIZERS



1872 4"- SCH. 40 FIOWLINE 237" WALL 316

FLOWLINE STAINLESS STEEL, MONEL, NICKEL and INCONEL WELDING FITTINGS

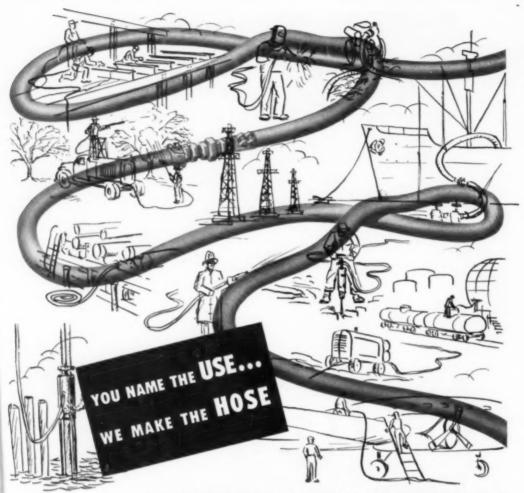
Preferred for Dependable Corrosion Service

WELDING FITTINGS CORP.

NEW CASTLE, PENNSYLVANIA World's Largest Manufacturer of Stainless Wolding Fittings

Features of FLOWLINE TEES

- · Cold formed seamless by the exclusive Welding Fittings process.
- Reinferced cretch too is stronger than pipe with which it is used.
- · Full center to face dimensions.
- · Ends machine tool cut and finished.
- · Annealed, cleaned bright, possivated.
- Heat number permanently stamped on each tee as record of actual analysis and physical properties.
- · Every tee is marked with type of metal, size, schedule, wall thickness, and FLOWLINE trade mark.



Our Condor Homoflex Hose is an example . . . Raybestos-Manhattan engineers found a way to build strength into a hose-wall without simply adding weight and thickness in more plies. The result, this Hose is flexible as a rope . . . and a real labor saver wherever men must constantly work with hose. On the other hand, Raybestos-Manhattan makes the world's largest and beaviest hose for oil drilling and loading, and for suction * Hose may not be your problem today, but whenever you think of industrial rubber products . . . transmission, conveyor, V-belts, or hose . . . remember R/M engineers have developed exclusive features to give you more for your money in every use. Consult your R/M representative.

RAYBESTOS-MANHATTAN, INC.



2 6

V-Balts











Other R/M products include: Industrial Rubber • Fan Belts • Radiator Hase • Packings • Brake Linings • Brake Blocks
Clutch Facings • Asbestos Textiles • Sintered Metal Parts • Bawling Balls

~STABILINE-



VOLTAGE REGULATORS

Two types of STABILINE Automatic Voltage Regulators are offered by The Superior Electric Company to meet the requirements of maintaining constant a-c voltage to electrical equipment.

INSTANTANEOUS ELECTRONIC

Type IE is a completely electronic unit with no moving parts. It provides almost instantaneous correction of line voltage or load changes. Waveform distortion never exceeds 3 per cent. Output voltage is held to within ± 0.1 per cent of nominal for wide line variations; to within ± 0.15 per cent of nominal for any load current change or load power factor change from 0.5 lagging to 0.9 leading. Type IE is versatile in application finding wide use in laboratory work, on test lines and as a component of other equipment where the most exacting voltage regulation is necessary. There are 28 standard models for 115 and 230 volts, 50 or 60 cycles, single phase operation ranging in capacity from 14 to 5 KVA. Special units are available for higher frequency operation . . . to meet government agency specifications . . . or for unusual applications.

ELECTRO MECHANICAL

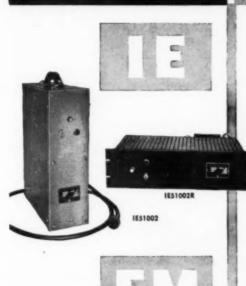
Type EM is an electro mechanical unit with a very sensitive detector controlling a motor-driven POWER-STAT variable transformer which feeds a buck-boost auxiliary transformer. Its outstanding advantages are zero waveform distortion and high efficiency. Type EM is most often used in the control of industrial loads. However; the demand of today's electronic equipment for constant voltage with absolutely zero waveform distortion necessitates the incorporation of a type EM as an integral part of the assembly. Type EM is offered in standard models for 115, 230 and 460 volts, 50 and 60 cycles, single and three phase duty in ratings from 2 to 100 KVA. Special units can be designed for higher frequencies, for conformance to government agency requirements and for individual needs.

FOR INFORMATION ON STANDARD STABILINE AUTOMATIC VOLTAGE REGULATORS SEND FOR BULLETIN 5351 . . . COMPLETE WITH ENGINEERING DATA, PHOTOGRAPHS, RATINGS, DIMENSIONS AND DIAGRAMS.



1401 THURE AVE, BRISTOL, CONNECTICUT

MANUFACTURERS OF POWERSTAT VARIABLE TRANSFORMERS, STABILINE AUTOMATIC VOLTAGE REGULATORS, VARICELL D-C POWER SUPPLIES, VOLTBOX A-C POWER SUPPLIES, SUPERIOR 5-WAY BINDING POSTS, POWERSTAT LIGHT DIMMING EQUIPMENT.











VERSENE ELIMINATES METALLIC CONTAMINATION

Foreign metallic ions are all enemies of industrial processing and products. They promote decomposition, rancidity, odor, coloration and cause many other undesirable reactions. Versene destroys these troublemakers by neutralizing them efficiently and economically. It does so by reacting with most metallic ions to form soluble non-ionic chelate compounds of such great strength that the alien ions are completely "liquidated", and can no longer interfere with the quality of your products and processes.

VERSENE OFFERS EXCEPTIONAL STABILITY

Completely stable in solution, Versene does not decompose in either acid or alkaline solution, or at high temperatures. It is stable and inert against attack from any chemical compound except strong oxidizing agents such as permanganate and acid dichromate. Available in dry or liquid form, the Versenes are the tetra sodium salts of Ethylene Diamine Tetra Acetic Acid and other polyamino acids. They are the most versatile and the most powerful complexing (chelating) agents known.

VERSENES - FOR QUALITY CONTROL

When your processes and products are upset by those troublemakers — foreign metallic ions — at least one of the seven Versenes can probably help you "liquidate" them. Call on the Versenes for quality control. Write Dept. B. Send for Technical Bulletin No. 2. Ask for samples.

NEW VERSENE WATER TEST KIT. Tells total hardness in 2 minutes. Accurate to one grain per gallon. Versenate Method. Complete Kit \$5. postpaid.

* Trade Mark

ERSWORTH CHEMICAL COMPANY

FRAMINGHAM, MASSACHUSETTS

Frovidance Agenth George Monn, 231 Fee Point Boulsyperd,
Frovidance, Rhode Island
W. Const Agenth Griffin Chemical Ca., Ser. Premisers, Base Island
W. Const Agenth Griffin Chemical Ca., Sen Francisco, Les Angeles
Engele & Fegs, Inc., Date and Houston Feans

Associated Chemical Co. of Canada, 14 Darrell Ave., Toronto, Ontorio Chas. S. Tansar Co., 1815 Liberty Life Bidg., Charlotte, North Carolina The Best from the Past PLUS ... PRITCHARD's

Forward Looking Ingenuity...

PRITCHARD

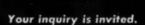
Also Offers You

the SINGLE RESPONSIBILITY CONTRACT

including

Petroleum Division

Natural Gas Division



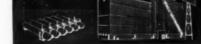


J.F. Pritchard & Co.

DESIGN . ENGINEERING . CONSTRUCTION

908 Grand Ave., Kansas City 6, Mo.

Bistrict Offices: CHICAGO . HOUSTON . NEW YORK . FITTSBURGH TULSA . ST. LOUIS . Representatives in Principal Cities from Coast to Coast



Relieve That
Excess Pressure
Automatically
—Instantly
With

Baker Rupture Discs

THE DISCS AS THEY GO TO YOU



Sometimes, in emergencies, the standard relief valve operates too slowly or fails altogether from clogging or damage by corrosion.

Our Rupture Discs are sure — act instantly — because they are without the disadvantages imposed by small passages or moving parts.

We make them of precious metals and, for certain applications, of base metals with a protective coating of platinum, gold or silver on one or both sides. They are immune to corrosion and are designed to fit the conditions under which they must operate.

The production of refined noble metals for Rupture Discs, and the discs made from them, are specialties of ours. There is a wide range of sizes guaranteed to blow at pressures of a few pounds or many thousands. Quick deliveries can usually be made.

Baker & Co., Inc.

By sending for our booklet with detailed descriptions you may be taking a step to save yourself a costly shut-down.

113 Astor Street, Newark 5, New Jersey
New York San Francisco Chicago

CUT MAINTENANCE COSTS...



You'll cut the annual cost of maintaining heat exchangers when you do the job with ELECTRUNITE Heat Exchanger Tubes . . . the electrically-welded steel tubes that add years to the life of process equipment.

Uniform diameters, inside and outside, assure trouble-free insertion and roller expansion of tubes, and reduce danger of weepers. Uniform structure assures predictable strength even under severe vibration and stress. Freedom from slivers and scabs prevents localized attack and poor roller expansion into the tube sheets.

Let us send you information on ELECTRUNITE Heat Exchanger Tubes for boilers, heat exchangers, and pressure applications of all types.

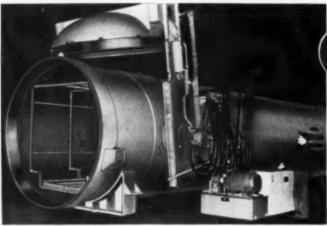
REPUBLIC STEEL CORPORATION
STEEL AND TUBES DIVISION
224 EAST 13111 STREET . CLEVELAND 8, OHIO

Made by the manufacturers of ELECTRUNITE Boiler Tubes . . . the original electric-resistance-welded pressure tubes.

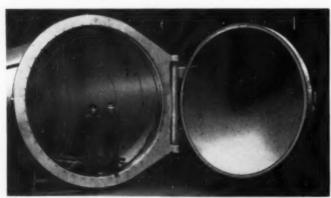




TO MEET ALL CODE REQUIREMENTS FOR PRESSURE OR VACUUM



10'0" Dia. x 75' Lg. Autoclave, with overhead hydraulically-operated Quick Opening Deer with automatic safety features, and for manual or automatic valve operation



12' Dia. x 28' Lg. Vulcanizer, with manually apprated Quick Opening Door.

STRUTHERS WELLS CORPORATION

Process Equipment Division . TITUSVILLE, PA. Plants at Titusville, Pa. . Warren, Pa. . Offices in Principal Cities

truthers

All Welded Design. for Manual or Hydraulic Operation

Designed for the ultimate in simplicity of operation for pressure or vacuum vessels, or a combination of both. SWC Quick Opening Doors make possible easier handling, faster opening and closing, and a lifetime of reliability.

Doors can be furnished in the conventional hinged type, or for opening overhead, as illustrated.

The hinged door, manually operated, is mounted on anti-friction bearings requiring a minimum of effort for opening or closing.

The overhead door, which is hydraulically operated throughout, offers the additional advantage of substantial savings in floor space. This door can be provided with controls for complete automatic operation, or with manually operated hydraulic valves for semiautomatic operation. In either case, safety features are incorporated in the hydraulic circuit.

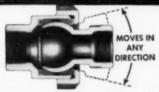
All doors are held in the closed position by a patented locking ring which requires no bolts. The locking ring is actuated by means of a hydraulic cylinder expanding the ring into the door frame groove for locking, and contracting the ring to open the door.

For complete description, write for our bulletin T-1200

BARCO to meet THE CHEMICAL INDUSTRY'S NEEDS Flexible JOINTS

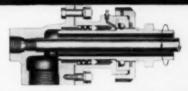
Wherever piping connections must move, look to BARCO for the ANSWER! Whatever your problem, Barco, invariably, can solve it BETTER, EASIER, and OUICKER with a tested and proven joint right out of the standard Barco line. This is because Barco builds a truly complete line of flexible ball, swivel, swing, and revolving joints-there is a size and type for every purpose! Submit your problem: ask for recommendations-Barco is at your service.

FLEXIBLE BALL JOINTS



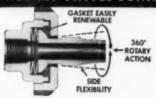
"One joint does the work of two or more!"-because it moves in any direction. Standard the world over where law cost, leakproof movable joints are needed in piping handling steam, air, water, oil, gas, or chemicals. Many models available. Up to 40° side flexibility plus 360° swivel action. Also used to facilitate quick connection of piping, overcome misalignment. Pressures to 6,000 psi; temperatures to 1,000° F. 15 different sizes, 1/4" to 12". Bulletin 215.

REVOLVING JOINTS



Minimum roll "drag" cuts power costs-up to 50% savings! Note wide spacing between bearings; inherent low torque little affected by pressure, speed, or temperature. Parts easily accessible. Light running action minimizes wear, permits free-floating installation. No adjusting necessary-long, leakproof service. Ratings to 250 psl (steam); 450°F. Single flow or syphon styles. Sizes 1/4" to 3". Wide choice of models; speeds to as high as 2,500 RPM. Bulletin 300.

ROTARY SWIVEL JOINTS



Exclusive angular motion prevents binding-only Barco offers this important advantage! Widely used for making compact, low torque swivel connections to reciprocating or rotating parts on platen presses, tire molds, oil burners. Easy to position piping accurately—no sagging, flopping lines. Leakproof, safe—pressure or vacuum. Ratings as high as 600°F., 3,000 psi (hydraulic). Sizes, 36" to 2"; angle or straight. Bulletin 265.

Send for **NEW BULLETINS**

For detailed information on Barco loints, write for latest literature: Bulletin 215: "Barco Ball Joints."
Bulletin 265: "Barco Swivel Joints. Bulletin 300: "Barco Revolving Joints."

Bulletin: "Barco Swing Joints."



SWING JOINTS



Here is a simple, low cost, precision-built swing joint that is ideal for many applications: oil loading and unloading lines, hose reels, water connections. "O" ring gives leakproof seal. Full bearing surface, swiveling 360° in one plane only, supports normal piping. Built for hydraulic pressures to 1,000 psi; temperatures, - 20° to 180°F. Male or female pipe thread connections, angle or straight. Sizes, 36" to 12". Ask for literature.

> Worldwide Sales and Service

MANUFACTURING CO.

1816 C Winnemac Ave., Chicago 40, Illinois In Canada: The Holden Co., Ltd.

The Only Truly Complete Line of Flexible Ball, Swivel, Swing and Revolving Joints

FREE ENTERPRISE - THE CORNERSTONE OF AMERICAN PROSPERITY

CHEMICAL ENGINEERING-February 1952

OUR GO TH ANNIVERSARY

Visible Proof of Invisible Quality

Your

Be sure it's . .

You can't check the bronze or analyze the steel or examine the fits between mating parts of a speed reducer. But you can count on the name of the manufacturer. The name Philadelphia on a product means 60 years of experience in making power transmission equipment. It stands for a company that builds all types and sizes of speed reducing units.

The worm gear reducer shown here is just one unit of a complete line that is built from 3" to 21" gear centers in a wide variety of horizontal and vertical styles.

Ratios from 3 5/8:1 to 6300:1 cover any application.

Send for our latest catalog WG-51 which shows complete details of the warm gear units. Please use



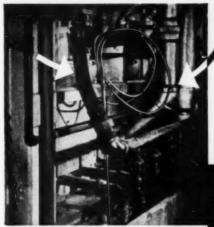
Dhiladelphia Gear Works, INC.

ERIE AVE. AND G ST., PHILADELPHIA 34, PA.

NEW YORK - PITTSBURGH - CHICAGO - HOUSTON - LYNCHBURG, VA.

IN CANADA. WILLIAM AND J G. GREEY LIMITED TORONTO

Industrial Gears and Speed Reducers LimiTorque Valve Controls



Carries Fire and Water

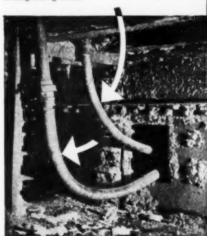
This coil of American Flexible
Metal Hose feeds gas to torch for
lighting annealing furnace
burners. It replaced nonmetallic
hose which rapidly deteriorated.
Large section of hose in foreground carries coolant water to furnace heater, compensates for pipe
line misalignment and expansion.

Permits Bigger Bite

Originally, swing joints connected 600 p.s.i. hydraulic lines to platens for holding metallic billets during shearing on this machine. But swing joints limited travel for billet size adjustments. Now American Flexible Seamless Bronze Tubing lets machine take maximum bite.

Ignores Molten Metal

Only metal hose like this American Flexible Interlocked Bronze Hose can ignore regular splashings by molten casting metal. These carry supply and return water at 150 p.s.i. for cooling casting molds.



Makes Unloading Easy

American Seamless Flexible Metal Tubing makes unloading this car of liquid propane easy. Propane vapor at 125 lb. pressure is pumped into tank car through combination % in. and 1 in. flexible metal tubing, forcing out propane liquid through 2 in. flexible tubing connection between dome and storage tank lines. American Seamless stands wear, makes car-sporting simple.



let it help you. American Flexible Metal Hose or Tubing can simplify your product or operations wherever flexible connectors are needed: for piping or ports that move, vibrate or are out of alignment; for carrying almost any liquid, gas or semisolid. American Flexible Metal Hose and Tubing are tight, strong and corrosion-resistant.

Bulletins SS-50 and CC-300 contain information you ought to have about these versatile products. For your copies, just write The American Brass Company, American Metal Hose Branch, Waterbury 20, Connecticut. In Canada: The Canadian Fairbanks-Morse Company, Ltd.

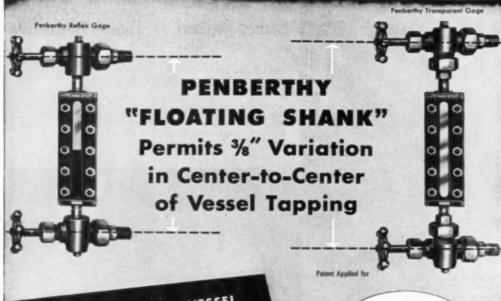
CHEMICAL ENGINEERING—February 1952

wherever connectors must move . . .



АнасоноА

FLEXIBLE METAL HOSE AND TUBING



COMPENSATES FOR VESSEL TAPPING INACCURACIES SAVES INSTALLATION TIME REDUCES GAGE STRESSES

An important new feature now available on all Penberthy drop forged steel gage valves is the "floating shank" . . . an improvement that has money-saving advantages to many users of liquid level and water gages.

The "floating shank" compensates for inaccuracies in the center-to-center distance of the tapped holes in the vessel on which the gage is mounted. The variation can be as much as 36". It provides a mounting flexibility not elsewhere obtainable . . . it saves time during installation of the gage . . . it eliminates stresses that are often induced during mounting.

The Penberthy "Floating Shank" can be had at slight additional cost . . . specify it on your next order for Penberthy drop forged steel (or alloy) gage valves,

Another First

PENBERTHY CYCLING JET PUMPS

Automatically operated by air, gas or steam pressure ... Will pump without clogging any liquid that will flow through pipes. Ask for Bulfetin 5030.



PENBERTHY EXPLOSION-PROOF SUMP PUMPS

Motor and switch totally enclosed. Underwriter approved for Class 1, Group D, and Class 2, Groups E, F and G hazardous location. Made of copper and bronze throughout. Ask for Bulletin 4929.



PENBERTHY EJECTORS



A simple jet pump operated by air, water or steam. Needs no lubrication . . . will not get out of order. Ask for Bulletin 5080,





ENBERTHY INJECTOR COMPANY

DIVISION OF THE BUFFALO-ECLIPSE CORPORATION

Detroit 2, Michigan

Established 1886

Conodian Plant, Windser, Onterio



You Can Clean <u>This</u> Fluid Strainer <u>Without</u> Stopping the Flow

Cuno AUTO-KLEAN is the only fluid strainer with "combaction cleaning" which permits it to work uninterruptedly. Dirt accumulations are dislodged while the straining goes on. This can be done automatically. Guaranteed to remove 100% of all solids larger than specified.



Removes More Sizes of Solids from More Kinds of Fluids

Strain fuels, lubricants, process fluids, etc.—AUTO-KLEAN Filter fuels, lubricants, process fluids, etc.—MICRO-KLEAN Clean raw water, recirculating water, etc.—FLO-KLEAN

Fluid Condilioning

CHEMICAL ENGINEERING—February 1952

"Non-Stop" Fluid Cleaning Saves Time, Protects Quality

Many chemical plants have welcomed the Cuno AUTO-KLEAN strainer as a means of eliminating the problem of periodically cleaning or replacing a fluid cleaner.

The AUTO-KLEAN does not have to be dismounted or taken apart for cleaning, and it has no replaceable element. Hence, no need to shut down the equipment, no risk of exposing the product to contamination or the operator to harmful fluids or fumes.

The Cuno auto-klean is continuously cleanable. The rotation of its all-metal discs against cleaner blades combs out accumulated solids which fall to the bottom for removal whenever convenient.

Never does process have to halt for sake of the strainer.

Many Metals Available

Cuno AUTO-KLEAN can be made in a wide range of materials to handle a wide range of fluids, viscosities, temperatures and solids. It is 100% permanent. The element is non-collapsible. It will last as long as the equipment on which it is installed.

Models are available for straining from .0035 to .062 in. Sizes to handle from a few to more than 4000 gpm.

¢	e	pł.	10	03.	À,	S	•	u	ih	1	VI	n		Si	kr	81	ei	, 1	M	ie	e	id	k	en	١,	•	à	×	18	ě.
p	le	os.	B 1	er	ıd	Ìe	ıń	04	re	RI	œ1	Ġ	Det	1	DH	0	C	'n	m	0		A)	U	T	0		q	£	Al	N
1	90		0 0			0	0	0	0	0	0	•	- (pe				i	0	0	0	0	0				۰		0	0
•	la	mı			×		*		*	×		20	9.5		×	×	×	×	×		*	*	×	*	*	*	×	æ	*	
•	o	mç	181	ıy			0	0	0	0	0	0			0	0	0	0		0	0	0	0	0	0	0	0	0	0	
d	ld	dr	68	١.	0.0	0	0	0	0	0	0						0	0		0	0	0	0	۰	0	0	0	0		0
4	21	у.										0	0	. 1	lo	n		0				5	h	at	e				0	0

Now a new name to start our second half century . . .

CHICAGO
METAL HOSE
CORPORATION



CHICAGO METAL HOSE DIVISION

Corrugated and convoluted flexible metal hose, machine tool conduit, refrigeration conduit, "Vibra-Sorber" vibration eliminators for piping, and assemblies for specific applications.



AIRCRAFT DIVISION

Stainless steel aircraft components including hose of all types, bellows, oil and fuel lines, air lines, ducting and connectors of all types and many special assemblies for jet aircraft.



FLEXON BELLOWS DIVISION

Stainless steel bellows, brass and bronze bellows, automobile thermostats and bellows and bellows assemblies and devices for all types of standard and specialized applications.



EXPANSION JOINT DIVISION

Standard corrugated packless type expansion joints in free-flexing and controlled-flexing construction, high pressure Flexoniflex expansion joints, heat riser expansion joints, and special joints.



• In 1947, Chicago Metal Hose Corporation introduced to industry a new science—the science of Flexonics. It is defined as the controlled bending of thin metals for use under varying conditions of temperature, pressure, vibration and corrosion. This definition so well describes our operations and the expanding range of our products that we are adopting it as our corporate name coincident with our 50th anniversary year.

Flexonics

poration

Let us assure you, however, that the change from Chicago Metal Hose Corporation to Flexonics Corporation involves no change in management, personnel or methods of operation except for internal organizational changes that will make it possible for a fast growing company to serve its customers better.

Flexonics man

orporation

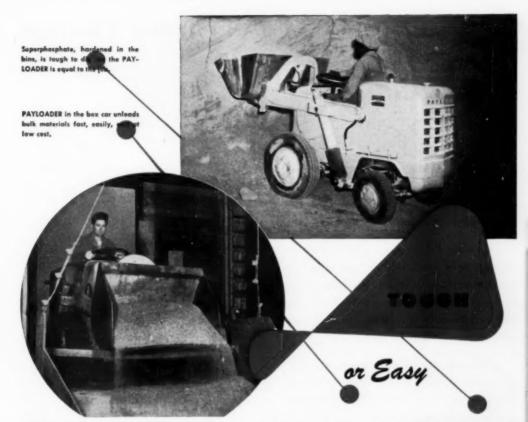
S. THIRD AVENUE . MAYWOOD, ILLINOIS

FORMERLY CHICAGO METAL HOSE CORPORATION -

Flexon identifies CAN products that have served industry for over 50 years.



Manufacturers of Convoluted and Corrugated Flexible Metal Hose in a Variety of Metals - Expansion Joints for Piping Systems - Stainless Steel and Brass Bellows - Flexible Metal Conduit and Armor - Assemblies of Theore Components In Canada: Flexanics Corporation of Canada, Ltd., Brampton, Ontario



PAYLOADERS Move Materials at LOW COST

Hundreds of "PAYLOADERS" are in use in all kinds of industries, handling all sorts of bulk materials. They dig full bucket loads quickly from bins of hardened superphosphate as well as scoop up free-flowing or lumpy chemicals and other materials... carry their loads rapidly through yards, doorways and aisles and deposit them neatly in bins, piles, hoppers or chutes. They unload box cars of bulk materials fast and cheaply, dashing in and out of car doors delivering their loads to nearby or distant points.

The use of "PAYLOADERS" is so widespread

that a tremendous amount of application experience has been accumulated so that accurate production and cost figures can be estimated for new applications. You are invited to find out how the "PAYLOADER" can boost production and cut material handling costs in your plant as they have in so many others. The Frank G. Hough Co.

754 Sunnyside Ave., Libertyville, Illinois.

HELP for your motorial handling problems

is in the pages of "Industrial Handling,"

the free Hough magazine. Catalogs on any size "PAYLOADER" (12 cs. ft. to 1½ cs. yd.) are also available, without obligation.

How to Effect Temperature Change

in Heat Exchangers Most Efficiently

This simple diagram shows the difference between the flow of liquid over Wolverine Trufin* as compared to the flow over plain tube.

Because Trufin has a greater outside surface area per foot, thereby effecting greater working capacity, this distinctive integral finned tube is capable of increasing the efficiency of your heat exchangers, oil coolers or condensers.

Reference to the accompanying diagram will show you how Trufin presents much more contact area to the fluid and also allows more free area for its flow.

These advantages contribute immeasurably to: (1) an increased heat transfer capacity of the unit, and (2) a decrease in pressure drop. These, in turn, often permit the use of smaller equipment, thus reducing wear and tear.

*Reg. U. S. Pat. Off.

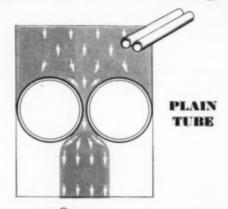
Walverine Trufin and the Walverine Spun End Process available in Canada through Unifin Tube Co., London, Ont.

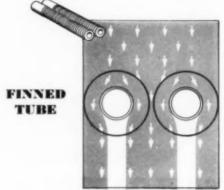
WOLVERINE TUBE DIVISION

Calumet & Hecla Consolidated Copper Company

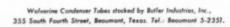
Manufacturars of seamless, nunferrous tubing

1427 CENTRAL AVE. . DETROIT 9, MICH.





This illustration shows the results found in our laboratory tests. A plain tube, 34" O.D. and Trufin having 34" root diameter were used in the tests (the outside diameter of the fins is comparable to that of the 34" plain tube). The center distance between the plain tube and the finned tube conformed to the code requirements of a minimum 15%" spacing. Both oil and water were used in the tests.





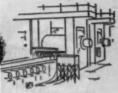
PLANTS IN DETROIT, MICHIGAN AND DECATUR, ALABAMA Sales Offices in Principal Cities

Export Department, 13 E. 40th St., New York 16, N. Y.



PRINTING INDUSTRY

It's the EXPERIENCE that counts...



STEEL INDUSTRY



PLASTICS INDUSTRY

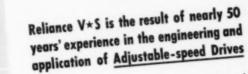


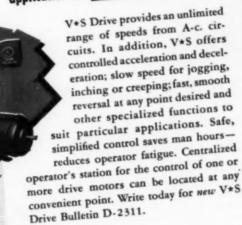


WIRE AND CABLE INDUSTRY









FOOD INDUSTRY



MINING INDUSTRY



TEXTILE INDUSTRY



Just after the turn of the century, the lathe above made news with its adjustable-speed Reliwith its adjustable-speed Reli-ance Armature-shifting Motor. Modern lathes (right) have built-in Reliance V*S Drives to provide control of all func-tions of spindle and speeds.

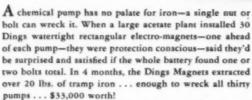




Threat to \$33,000 Removed by Dings Magnets

Acetate Plant Gets Surprise:

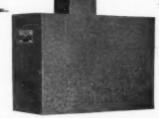
Unloads 20 lbs. of Iron



This plant achieved its objective to a degree beyond expectations. Three factors were responsible: (1) applying exactly the right magnet for the job; (2) the magnet itself was highly engineered and quality built; and (3) the magnet was correctly installed. Whatever your tramp iron problem, those are the things you buy when you buy a Dings "Job Selected" Magnet. Investigate today.

Dings Magnetic Separator Company

4730 W. Electric Ave., Milwaukee 46, Wis. World's Largest Exclusive Builder of Magnetic Separators



THIS IS THE TYPE THAT DID THE JOB. The magnet that fit this job best is a Dings Rectangular (electro), a particularly versatile magnet which is effective at distances up to 18". Its triple pole design makes it effective on the most difficult jobs; fast mov ing conveyor belts, wet, sticky material, etc. Can be adapted in any number of ways to suit particular requirements. Catalog 301-A gives details.

This Catalog Helps You to "Job Select" a Magnet Is the material you want de-ironed solid . . . semisolid . . . liquid? Is it carried in chutes . . . ducts . . . conveyor belts? Catalog 5000-8 lists Dings complete line by application, describes all Dings magnets from the low cost, non-electric "Perma" Plate magnet to the most power-

ful magnetic separators known. Send for it teday.













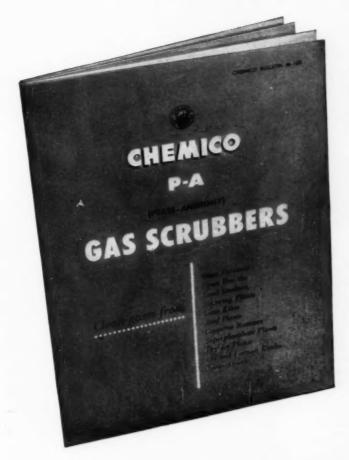






February 1952-CHEMICAL ENGINEERING

High Gas Scrubbing Efficiency AT LOW COST!



This Chemico bulletin contains factual information on the two types of Chemico P-A Gas Scrubbers. Both scrubbers offer high collection efficiency at low cost. Both are now being successfully used in a wide range of industries.

The bulletin gives performance data on the P-A Venturi Scrubber that effectively and economically removes sub-micron dusts, fumes and mists from industrial gases, and the P-A Cyclonic Scrubber for the removal of micron-size dusts from gas streams. If you have a gas scrubbing problem, write us detailing your specific requirements.

CHEMICAL CONSTRUCTION CORPORATION

A UNIT OF AMERICAN CYANAMID COMPANY

488 MADISON AVENUE, NEW YORK 22, N. Y.

CABLES: CHEMICONST, NEW YORK

TECHNICAL REPRESENTATIVE IN EUROPE—CYANAMID PRODUCTS LTD., LONDON TECHNICAL REPRESENTATIVE IN SOUTHERN AFRICA—SOUTH AFRICA CYANAMID (PTY) LTD., JOHANNESBURG



Chemico plants are profitable investments

....



Poday's demand for increased production in the chemical industry has spotlighted the absolute dependability of WILFLEY Acid Pumps. In chemical plants all over the world this great pump is making impressive production records in low-cost handling of acids, corrosives, hot liquids, mild abrasives and other solutions. 10- to 2,000-G.P.M. capacities; 15- to 150-ft. heads and higher. Wetted parts of practically all machinable alloys. Plastic lined models available. Individual engineering on every application.



Bulletin E-7000 shows Model "AF" Acid Pumps in direct-drive, belt-drive and overhead belt-drive models. Write or wire for your copy today.

Buy Wilfley for Cost-Savin

A. R. Wilfley & Sons, Inc. Denver, Colorado, U.S.A. . New York Office: 1775 Broadway, New York City

the famous Wilfley

Sand Pump

Save up to 21/Gal.

WITH

SPECIAL SOLVENTS

BY Celanese

Celanese* Solvent 203 is a primary butyl alcohol solvent formulated expressly to meet the requirements of nitrocellulose lacquers and thinners, SAE brake fluids, and other applications. It is composed of normal butanol, with some isobutyl and amyl alcohols. Use it in most applications as a cost seving replacement for normal butanol.

Celanese Solvent 301 is approximately two parts secandary butanol and one part of normal propanol. It is used economically in nitrocellulose formulations, in brake fluid mixtures, and in diluent and extender applications. Celanese Solvent 601 is a low cost proprietory solvent containing methyl ethyl ketone, butylene axides, and certain acetals. It is offered as a cost saving replacement for MEK to meet the requirements of vinyl and nitrocellulose solution formulators . . . lacquers and thinners.

Celanese Solvent 901 is a high solvency alcohol-type solvent competing with MIBC (Carbinol) and methyl amyl acetate. It is used as the high-boiling component of lacquers, thinners, and other coating formulations. It is recommended for control of blush resistance and flow.

Take advantage of the **ell-around** economy of Celanese Special Solvents. Write for chemical bulletins and sample quantities. Evaluate them for performance and cost savings in your products. Celanese Corporation of America, Chemical Division, Dept. 553-8, 180 Madison Avenue, New York 16.

CHEMICALS by CELANESE

Butyl Alcohols n-Propanel Methanol Acetaldehyde Paraformoldehyde Formaldehyde formaldehyde in Alcohols Acetic Acid
Acetone
Butylene Glycols
Dipropylene Glycol
Propylene Oxide
Tricresyl Phosphates
Special Solvents

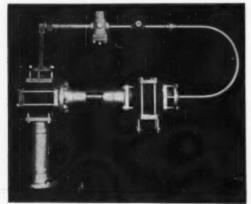


for Process Engineers

C.H. Wheeler

COOLING TOWERS—VACUUM REFRIGERATION—HIGH VACUUM PROCESS EQUIPMENT—MICRO-PARTICLE

REDUCTION MILLS-STEAM CONDENSERS-STEAM JET EJECTORS-MARINE CONDENSERS & EJECTORS-DECK MACHINERY



Two-stage non-condensing impervious graphite ejector

Send for catalog 1462. It contains helpful tables and tips on Steam Jet Vacuum problems. It also describes the complete line of C. H. Wheeler Tubeiets. It will be mailed at no obligation to you.

STEAM JET EJECTORS Made of IMPERVIOUS GRAPHITE For Handling CORROSIVE VAPORS

If your vacuum equipment is inefficient due to corrosion from acid fumes, this item holds an answer to your problems.

For highly corrosive acids such as sulphuric, hydrochloric, nitric, etc. C. H. Wheeler impervious graphite ejectors are recommended. The impervious graphite is enclosed in a steel or cast iron casing to prevent breakage. It is light in weight, non-porous, with low coefficient of thermal expansion and high resistance to thermal shock. Impervious graphite is most commonly recommended for the single and two-stage non-condensing ejectors.

C. H. Wheeler Ejectors can also be furnished of other materials such as acid resisting bronze, monel and stainless steel where the corrosive action of the vapors being handled does not require the use of impervious graphite construction.

"SELF-CLEANING" CONDENSERS by REVERSE FLOW featured in C. H. WHEELER Bulletin

The C. H. Wheeler Manufacturing Company's unique design of an integral reverse-flow steam condenser provides the most practical method yet devised for cleaning the tube sheet, and eliminates the need for expensive mechanical water straining apparatus. A recently issued bulletin tells how it works.

For C. H. WHEELER Literature Attach this Handy Form to Your Company Letterhead

Interested in following literature

- ☐ Steam Jet Ejectors (catalog 1462)
- "Self-Cleaning" Reverse-Flow Steam Condensers

Your Name

Your Job

(Literature will be mailed to address shown on your company letterhead)



ANOTHER TOWER FOR SAN ANTONIO
13 Cell, 55,000 GPM Capacity to be Built by C. H. Wheeler
for City Public Service Board, San Antonio, Texas. Gibbs &
Hill, Engineers & Constructors

Following construction of two 7-cell Cooling Towers at the Leon Creek Power Station of San Antonio, Texas, C. H. Wheeler has been awarded the construction of a third and larger tower. The first towers were designed for 30,000 GPM. The new tower will handle 55,000 GPM to serve a 60,000 KW generator. It is a 13-cell induced-draft tower designed for 76.5° wet bulb, taking water at 105.5° inlet and cooling it to 90° outlet. Proposed construction is 39'8" x 364' x 29'. It will resist 30 lbs, per square inch wind pressure, or 100 mph hurricane force. Gibbs & Hill, New York are the engineers and constructors on the job.



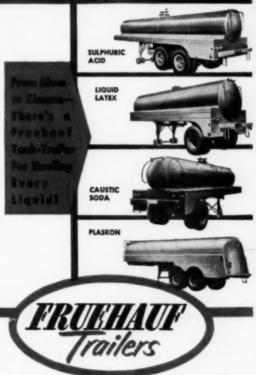
THIS Fruehauf Tank Train, operated by the Consolidated Paper Company of Monroe, Michigan, hauls 13,800 gallons of liquid alum daily in three trips to a supplier 30 miles away. Each tank has a capacity of 2,300 gallons, is constructed with properly spaced baffleheads to prevent load surge, and is equipped with Multi-Rate Suspension for the utmost load cushioning.

In addition to large freight savings, Consolidated has realized numerous advantages in the operation of its Fruehauf Tank unit. There is no waiting for freight schedules. The supply of liquid alum is steady, can be routed where and when it's needed for greater plant efficiency. Consolidated operates many additional Fruehaufs to haul acids, inks, and chemicals used in the making of paper.

Fruehauf Tank-Trailers perform specific liquid hauling jobs in hundreds of industries. Many standard models and every kind of special are carefully engineered to meet unusual problems of flow, temperature, and weight.

FRUEHAUF TRAILER COMPANY, DETROIT 32, MICH

Whatever your liquid hauling problem is, why not give Fruehauf engineers a chance to prove how Fruehauf Tank-Trailers can do the job safely, more efficiently, and at considerable savings? Write for the free illustrated catalogue for complete information on Fruehauf Tank-Trailers. Fruehauf Trailer Company, 10940 Harper Avenue, Detroit 32, Michigar.



Light Weight—Strongly made of steinless steel to protect your chemical predocts while reducing transportation costs.





One-Man Headling— These compact,lightweight 13½-gailen berrels are easily and safely handled by one man.



stainless steel chemical containers reduce handling costs







Perfect Stacking—Bottom foot ring fits snugly and securely over top ring of first barrel to build a safe, compact stack.





is practical—transportation costs are lower—storage requirements are reduced—breakage and spilling hazards are eliminated. Made in several types of stainless steel for specific product protection. Write today for full details.

Here's the modern way to ship and store acids, solvents, extracts, fruit juices, oils and many other dangerous or perishable products. Use Hackney Stainless Steel Chemical Containers and save handling costs all along the line. You'll find one-man handling

Pressed Steel Tank Company

Manufacturer of Hackney Products

1447 S. 66th St., Milwaukse 14 • 1333 Yenderbill Conceurse Bidg., New York 17 • 203 Hanne Bidg., Claveland 15 936 W. Pauchino St., N.W., Room 113, Atlanta 3 • 208 South La Salle Street, Room 792, Chicage 4 • 553 Received Bidg., Les An

CONTAINERS FOR GASES, LIQUIDS AND SOLIDS

what do you want to pump?

We frankly don't know all the products that an IMO can pump, but if you want a better way to transfer fluids like these from one place to another, chances are an IMO can do the job for you.

The IMO is a screw-type rotary pump. Its axial flow design permits liquids to be pumped close to the rotating axis of the rotor. This means low liquid velocity through the pump and quiet pulsation-free flow. Capacities range to 1000 gpm at 500 psi and 150 gpm at 1500 psi.

Write for Bulletin



DE LAVAL STEAM TURBINE CO., TRENTON 2, N. J.







H.P. pipe gaskets like these made to your order

by gasket specialists...









... to save you both time and money

When you need metallic gaskets for high pressure piping, put the job up to Johns-Manville Goetze Gasket specialists. You benefit in many ways:

You get the exact gaskets you need for maximum efficiency under your operating conditions, tailor-made to fit your equipment. You get the savings in cost made possible by intensive specialization and modern production tooling. And you get the full benefit of over sixty years' experience in designing specialized metallic gaskets for industry's most complex sealing requirements.

Typical styles of Johns-Manville Goetze Gaskets that have been made to order for high pressure

piping service are shown above. The flare type gasket with bellows action and the solid flare type are particularly suited for pressures above 5000 psi; the profile and V-Tite gaskets are generally used for lower pressures. Each of these is fabricated to extremely close tolerances. Other styles can be made to any desired cross section to meet your individual requirements.

For more information about Johns-Manville Goetze Gaskets, write for your copy of Catalog PK-35A. Or send us your drawing or template for an immediate quotation. Address: Johns-Manville, Box 290, New York 16, N. Y.



Johns-Manville *Goetze* GASKETS

THERE'S A JOHNS-MANVILLE PACKING AND GASKET FOR EVERY SERVICE



STEEL...

W-S Screw-End and Socket-Weld Fittings

There are several big benefits to you implied in this simple statement of fact about W-S Fittings.

First, forging means strength—the strongest, most compact physical form, steel for steel, obtainable by commercial methods of fabrication.

Second, being stronger, forged fittings are much smaller and lighter, size for size, than other types.

Third, dimensional accuracy is characteristic of the forging process—and because forged bodies are more accurate, they chuck better, can be machined to closer, more uniform tolerances than other types.

To these inherent advantages of forged fittings, add Watson-Stillman's modern manufacturing facilities, a production control system that's airtight from furnace to finished product, and a sales engineering staff dedicated to SERVICE in the largest sense of the word. The total is heavily weighted in favor of the advantages of W-S Double-Diamond Forged Steel Fittings.

• Stronger • Smaller • Lighter • Tighter

SOLD THROUGH LEADING DISTRIBUTORS . . . EVERYWHERI



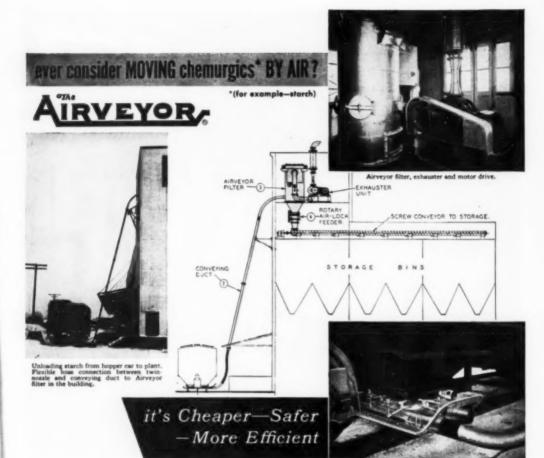
DISTRIBUTOR PRODUCTS DIVISION

ROSELLE, NEW JERSEY

Designers and Manufacturers of Forged Steel Fittings, Wire Rope Shears, Hand Pumps, Jacks, Pipe Benders and Hydraulic Equipment

CHEMICAL ENGINEERING-February 1952

419



Twin-nozzle arrangement for hopper-car unloading

The Airveyor in your plant is like having the shipper deliver right to your storage bins. And it goes a step better than that! The Airveyor not only unloads and conveys from car to storage, but a flip of a switch delivers your material direct from storage to process.

And while it's being efficient, it's also saving you money.

The Airveyor pays for itself in a relatively short time. It saves the difference in cost between bag and bulk shipment, and also lowers the cost of handling and storage. Labor costs are reduced because the Airveyor requires the attention of only one man. Important from the safety angle is the fact that

dusting has been eliminated.

Maintenance time and costs are negligible because there are very few moving parts. The system can be blown clear of all residue. Retention of all visible dust is assured.

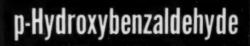
Installation of this better method of handling starch, soda ash, lime, salt cake, clay, or other dry pulverized materials will prove of great advantage to you. Why not consider Airveyor's possibilities in your plant? Without obligation, a Fuller engineer will analyze your present conveying system and show, you how the Airveyor can help in your operations.

Fuller

DRY MATERIAL CONVEYING SYSTEMS
AND COGLERS—COMPRESSORS
AND VACUUM PUMPS—FEEDER
AND ASSOCIATED EQUIPMENT

FULLER COMPANY
Catasauqua, Pennsylvania
Chicago 3—120 So. LaSalle St.
San Francisco 4—420 Chancery Bidg.

A-124





PROPERTIES

SOLUBILITY (approximate)

(grams per 100 grams solvent, at 25°C.)

Acetone		*															70
Alcohol .	*	- 81	*					*		*			1	Ve	ry	10	uble
Benzene																	. 4
Carbon te	t	rac	hle	orio	de		0	4					*		le	tsol	uble
Ether .	*				*	*	*				×	*	*				18
Methanol	8						*				*						90
Water .	(6)			*	*		*						*				. 1
Water (at	t	80	°C	j				*	*				1	۷e	ry	10	uble

iafora stico write:

THE DOW CHEMICAL COMPARY. . GIDLARD, MICHIGAL

Send for Experimental Sample Send for Experimental Sample

The Dow Chemical Company Fine Chemical Sales

Midland, Michigan

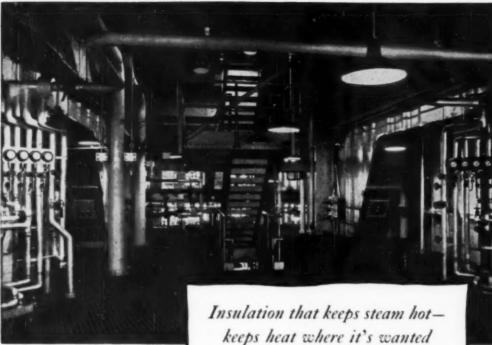
Address

City_____State



CHEMICALS

INDISPENSABLE TO INDUSTRY



Large eastern power station: Piping insulated with "Featherweight" 85% Magnesia, sewed canvas jacket, ducts with 1½" "Featherweight" blocks and 1½" thickness of cement. Insulation Contractor: Armatrong Cork Company.

"FEATHERWEIGHT" 85% MAGNESIA

-insulation that delivers more steam at less cost! For more than 60 years "Featherweight" 85% Magnesia Insulation has been known throughout industry for outstanding efficiency in all heating applications up to 600° F. You'll find it in power stations and steamships, in hospitals and food processing plants, in oil refineries and chemical installations—in fact, wherever exacting steam temperature control is a must.

And "Featherweight" 85% Magnesia not only gives you efficiency, but also extreme durability. It is structurally strong; can withstand reasonable amounts of compression, vibration, and contact. Physically inert. "Featherweight" will not spall or crack when subjected to the alternate heating and cooling of steam system start-ups and shut-downs. And, being entirely mineral in nature, it will not burn. In short, it is difficult to overestimate the efficient life of "Featherweight" 85% Magnesia. In most cases, it will outlast the heating system!

Your Keasbey & Mattison Distributor, who is an experienced applicator, will be glad to give you complete information on "Featherweight" 85% Magnesia. Or, write us direct.



Nature made Asbestos . . . Keasbey & Mattison has made it serve mankind since 1873

KEASBEY & MATTISON

COMPANY . AMBLER . PENNSYLVANIA



G-E Pyrometer Equipment Quick and Easy to Inspect, Maintain

Routine inspections of new General Electric Type HP pyrometers can quickly be made. Besides making preventative maintenance easy, this equipment has many other features to provide accurate indication and temperature control of furnaces, ovens kilns, and other industrial heating equipment.

ACCURATE WITHIN 34 OF 1% full scale, HP-3 pyrometers have automatic coldiunction compensation that adjusts for changes in ambient temperature.

Any change in temperature, even as small as 0.1% full scale, starts immediate control action. Normal changes in humidity, ambient, and voltage have little or no effect on the exactness of control action.

FOUR TYPES AVAILABLE—indicating. protecting, two- and three-position control forms; also both flush and surface mountings. All available in a variety of temperature ranges in the 0-3000 F span.

Mail the coupon for complete information about Type HP pyrometers.



New Shadow-proof Temperature Indicators Are Easier to Read

Temperatures from -100 F to +300 F can now be accurately indicated and controlled with General Electric's new line of temperature indicators. These instruments can be read from almost any angle. The dial is set forward, flush with the front of the case. A protruding convex-type glass front provides clear illumination. No more cover overhang; no more shadows caused by overhead lighting. Two sizes available-41/4- and 83/4inches. Check coupon.

New Resistance Thermometers Accurately Indicate and Control Low Temperatures

TEMPERATURES FROM - 100F to +300 F can now be accurately indicated and controlled with General Electric's new line of resistance thermometers. They indicate accurately within 3/4 of 1 per cent full scale. Any change in temperature equivalent to 1/10 of 1 per cent full scale starts immediate control action.

Normal changes in humidity or room temperature do not affect the exactness of control. Neither does a change in control voltage. Sturdy, simple construction assures reliable operation under severe operating conditions.

small as 90 degrees, are available any- either flush or surface mounting. where in the -100 F to +300 F range. You can buy four types of resistance coupon below.



thermometers-indicators, protectors, and NARROW TEMPERATURE SPANS, as two- or three-position controllers-for

For complete information, mail the



THERMOCOUPLE POTENTIOMETER measures temperature in locations inaccessible to glass-stem thermometers. Any number of different readings can be taken in rapid succession and accurate within ±0.2% of full scale.

Typical applications include refrigerator-development work, oil-burner and airconditioning tests, steam temperature measurements, and heat-run tests on electric equipment. For complete information, mail the coupon below.



THERMOCOUPLES, COMPONENTS, AND ACCESSORIES for your pyrometer installations include protecting tubes and wells, thermocouple wire, ceramic insulators, extension wire, connectors, heads, selector switches. Send coupon today for catalog to help you obtain proper thermocouple assemblies.

Resistance Bulbs Accurate Within +1 F between -100 F and +300 F



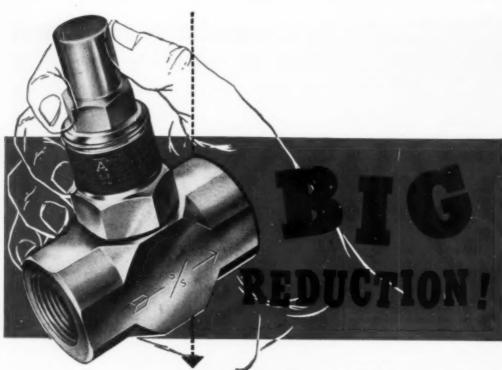
FOR ANY RESISTANCE THERMOMETER INSTALLATION, new G-E resistance bulbs offer a high degree of accuracy and reliability. They're available either with completely enclosed terminal head or without terminal head and with four feet of flexible cable. Units will retain calibration within 0.1 F. For complete information, mail the coupon below.

	ION H 602-227, GENERAL ELECTRIC INECTADY 5, N. Y.
Pleas	se send me the following building ate:
V	for reference only
*	for planning an immediate projec
	Resistance Thermometer (GEC-835)
	Resistance Buib (GEC-835)
	Type HP-3 Pyrameter (GEC-713)
	Temperature Indicators (GEC 2188)
	Thermocouples, Accessories (GEC 714)
	Thermocouple Potentiometer (GEC 245)
HAI	AE
COA	APANY
STR	IT
cm	ZONE STATE

GENERA



ELECTRIC



8-hour job now takes 4 hours

At a western magnesium reduction plant something besides magnesium has just been reduced. The steam at the end of the 1½ mile long steam line wasn't so hot—and neither was the production record of the plant at that location.

Then 26 old-type steam traps were replaced with Yarway Impulse Traps. Now there is only a 15° temperature drop from the boilers to the end of the line. Most important, the plant 1½ miles from the boilers is now able to do work in 4 hours that previously took 8 hours.

That's trap efficiency! It's evidence of the fact that Yarways are designed to send the most premium B.T.U.'s at top temperatures into your process or product. They get equipment hotter, sooner . . . and keep it hot.

Other Yarway features—small size, one moving part, easy installation, low maintenance, low cost, stainless steel construction. Nearly 750,000 Yarways have already been installed. For your Yarways, see a nearby industrial distributor . . . 216 stock and sell Yarways.

YARNALL-WARING COMPANY, 137 Mermaid Ave., Philadelphia 18, Pa.



FREE TRAP SELECTOR

It's important to have the right trap in the right place. New 20-page selector tells quickly and easily which is the right Yarway trap for any application. Write for your free copy.



the steam trap

designed with more production in mind



these are welded by the Inert-Gas-Metal-Arc method. DOWNINGTOWN is experienced in building equipment with Bimetalic, Finned Tube and Impregnated Graphite.

Design and construction meet requirements of A.S.M.E. Code or other agency specified by customer. Equipment of our design is sold on a guaranteed performance basis or we will fabricate to customer's drawings. Modern facilities available for radiographing where required. Remember: "Your Needs are Our Specialty!"

Write on your letterhead for DOWNINGTOWN literature on shell and tube heat exchangers.

W YORK OFFICE: 30 CHURCH STEET



These new fittings reduce piping costs by 10% to 40%



Speedline aligning connector

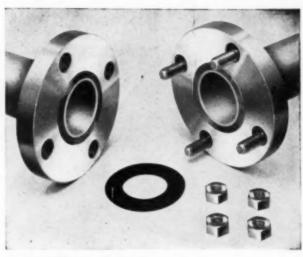
loins pipe schedules 5, 10 and 40 and is also made for tubing.



Speedline tube union

Combines best features of screwed pipe and sanitary unions; eliminates leakage encountered with ground joint type fittings.





Speedline insert flange

Corrosion-resistant serrated insert in a carbon steel flange. Only tools needed for assembly are a standard expander and open end wrench.

• This is the first complete line of corrosion-resistant fittings for use with light-walled Schedule 5 pipe.

First cost of Speedline Fittings is less than you're used to paying for fittings. And your savings in costs for pipe, valves, etc. are tremendous. Speedline elbows, tees, reducers, etc. are specially designed to simplify installation. These fittings will also reduce installation time, saving you still more on your piping work.

The Speedline Fittings book gives you the complete story—savings combined with strong, safe process piping layouts. We'll be glad to send you a copy.



Corrosion-Resistant FITTINGS

-the newest thing in pipeline economy

HORACE T. POTTS CO.

Since 1815

Erie Avenue & D Street · Philadelphia 34, Pa.

Get the inside facts



on unique, multi-purpose
THERMOSWITCH®

thermostat

This New Catalog

explains superior principle of temperature control that results in:

- High sensitivity, high load carrying capacity, low thermal lag, and wide adjustment range
- Complete enclosure against dust and dirt
- High resistance against shock and vibration
- Low cost and ease of installation

CONTAINS-

- Detailed specifications of all types of THERMOSWITCH units
- Complete discussion on proper methods of installing temperature controls
- Price List included with each catalog



THERMOSWITCH®

Precision, Multi-Purpose, Thermostat Controls

SENSITIVE...but only to heat

FREE

Get this Catalog . . . see what Fenwel THERMOSWITCH units can do for you. Just fill in coupon and mail . . . no obligation.

FENWAL, INCORPORATED, 162 Pleasant St., Ashland, Mass. • Los Angeles, Cal.
ELECTRIC TEMPERATURE CONTROL AND DETECTION DEVICES

Name Position

Company

Street

City......Zone State....

COUPON

TODAY!

MAIL

There's only one TAPER LOCK



True Running

Easy on-Easy off



TAPER-LOCK bushing grips the shaft for the full length of the bushing — holds sheave with firmness of a shrunk-on fit. No wobble. Taper-Lock runs true!

No flange—no collar—no protruding parts. Flush machine-tool appearance.

Finest grade of close-grained semisteel, cast in the Dodge foundry.

The grooves, machined on precision equipment, have identical pitch diameters.

This insures equal belt tension. Every belt pulls its share of the load!

TAPER-LOCK sheaves are available from distributors' stocks in complete range of sizes in A, B, C and D grooves.

DODGE SEALED-LIFE BELTS have special protection for tension members, insuring longer belt life. Perfectly matched to TAPER-LOCK sheaves.

DODGE MANUFACTURING CORPORATION, 200 Union Street, Mishawaka, Ind.



of Mishawaka, Ind.













W-BELTS AND TAPER-LOCK SHEAVES BROKE!

DODGE-THINKEN PILLOW BLOCKS

ROLLING GRIP AND DIAMOND D CLUTCH

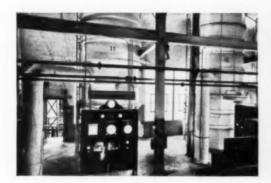
SOLIO STEEL CONVEYOR PULLEYS

NAME PLATES

FOR YOUR NAME PLATE REQUIREMENTS, WRITE OUR SUBSIDIARY, CHICAGO THRIFT-ETCHING CORPORATION, 1355 SHEFFIELD AVENUE, CHICAGO 22, ILLINOIS

See
General American for
CREATIVE
EVAPORATOR
ENGINEERING

engineers will modify tested basic designs to fit YOUR production!





Built to specialized designs for each specific application, General American Conkey evaporators are meeting flow sheet requirements in every branch of the chemical industry.

Conkey evaporator installations deliver a uniform product with virtually complete recovery of solids, at maximum economy—even when operated by unskilled labor.

Because evaporation is a unit operation, Conkey evaporating equipment is individually designed for specific operating conditions—to fulfill desired economy and performance requirements. Basic types of known characteristics and performance are modified in design and materials of construction to meet needs of your operation.

Because of the huge number of variables encountered, each evaporator problem must be treated individually. Conkey engineer specialists will help you meet the performance and economic requirements of competitive production in any field. For complete technical information, write for Evaporator Bulletin. Designed to do your job best:

Other General American Equipment:

Turbo-Mixers, Filters, Dewaterers, Dryers, Towers, Tanks, Bins, Pressure Vessels

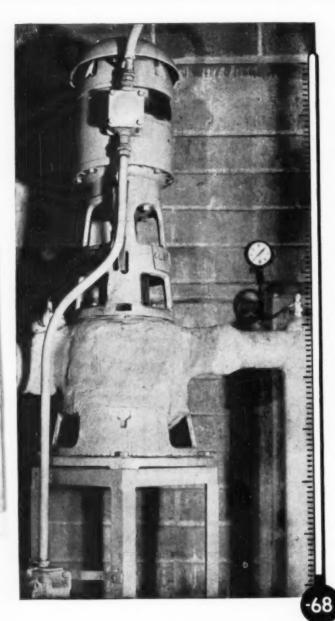
OFFICES IN ALL PRINCIPAL CITIES



Process Equipment Division GENERAL AMERICAN

Transportation Corporation Sales Office: 10 East 49th St., New York 17, N.Y. General Offices: 135 S. La Salle St., Chicago 90, Ill.

In Canada: Canadian Locomotive Company, Ltd., Kingston, Ontario



When the FROST is in the pump

Pumping trichlorethylene at 68° below zero, F., presents some unusual problems due to expansion and contraction of metals under severe temperature variations. The packing difficulties alone would be quite a maintenance headache, except for the fact that this LaBour Type G has no packing, no stuffing box. And if performance were in any way dependent on close clearances within the pump, it would be quite a trick to start a warm pump after a shut down.

The LaBour Type G handles this job perfectly without a bit of trouble. Being self priming, it cannot vapor bind at any temperature which permits liquid to exist as such within the pump. No temperature variation as between inside and outside can cause it to leak around the shaft, nor can temperature extremes affect its sealing action.

Of course this is not a common application. But LaBour pumps do the uncommon jobs easily because they've been designed and built by a company which has lived with the chemical industry's liquid handling problems for nearly 30 years. If you can't afford to take chances with your pumping equipment, you can't afford anything less than a LaBour.

ORIGINAL MANUFACTURERS OF THE SELF-PRIMING CENTRIFUGAL PUMP

LABOUR

Taffilla.

THE LABOUR COMPANY, INC. * Elkhart, Indiana, U.S.A.



NEED CALCIUM CHLORIDE?

Check Solvay First



CALCIUM CHLORIDE

- for . Dustlaying . Drying Air
 - Removing and Skidproofing Ice
 - Concrete Work
 - Refrigeration Brine
 - Freeze-proofing Coal
 - Industrial Waste Treatment
 - Chemical Manufacturing
 - Industrial Processing

And Be Sure of getting the dependable quality and uniformity offered by America's oldest and largest producer of alkalies and associated chemicals.

And Be Sure of delivery service from strategically-located major plants and over 700 local stock points, distributors and dealers.

Anti Be Sure of a special Calcium Chloride Technical Service and exclusive, authoritative literature that provides expert advice on the many individual uses of Calcium Chloride.

And Be Sure of sales service that is handled by a staff of thoroughly trained, helpful salesmen operating from thirteen convenient branch sales offices . . . plus a nation-wide organization of selected jobbers and representatives.

SOLVAY SALES DIVISION

40 Rector Street, New York 6, N. Y.

- BRANCH SALES OFFICES:-

oo • Charlotte • Chicago • Cincinnati • Cleveland • Detroit • Houston Orleans • New York • Philadelphia • Pittsburgh • St. Louis • Syracuse

Seda Ask - Caustie Seda - Caustie Potash - Nytron - Chlorice - Patasisium Carb Catelium Chforide - Sedium Bicarbonate - Seccialty Cleanors - Sodium N Ammonium Bicarbonate - Pare-dichinobenzene - Ortho-dichinobenzen Munachturchenzene - Methanal - Furmaldelyde - Ammonium Chforide



Ever see a bronco at the first touch of the saddle? Ever see a gusher well come in? The resemblance doesn't end with the furious first burst of action, even though the saddled pony stands quiet . . . and the stream of black gold pours placidly

Breaking a fractious horse . . . cracking petroleum . . . makes them both useful. And both tasks throw the full test of pressure on the men who tackle the job . . . and on the equipment

into the refinery-until man renews his taming process.

Tanks and towers . . . in fact all refinery and chemical equipment built at Sun Ship has been meeting the toughest tests of pressure through years of service. That's to be expected. The men of Sun Ship who build it have shown their ability to meet and master the production pressure of time . . . and the engineering and shipping problems that go with the task of constructing and delivering the gigantic equipment that helps build a greater and stronger America.



ON THE DELAWARE . CHESTER, PA.

25 BROADWAY . NEW YORK CITY

lat is also a Helpline!

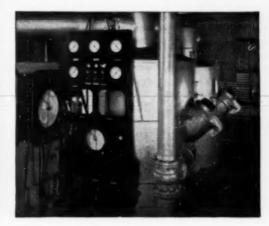
- 1. BUFLOVAK CHEMICAL AND FOOD PRODUCT **EVAPORATORS**
- 1. For concentrating Chemicals, Pharmaceuticals, Antibiotics, and Food Products; BUFLOVAK Evaporators offer worthwhile operating advantages.
- 2. PROFITABLY MEET YOUR EXACTING REQUIREMENTS
- 2. Advance design, in many types, with such features as low operating temperatures, high vacuum, immaculate cleanliness, simplified operation, and automatic controls, give you the product you want.
- 3. BY DOING THE JOB BETTER AT LOWER COST
- 3. By making what you want, the way you want it, quicker, easier and better.
- 4. AND THE RESULT FOR YOU -GREATER PROFITS
- 4. And by saving heat, recovering illusive solids, and shaving off costs, the end result is Greater Profits!

May we send Catalog 351?

BUFLOVAK RESEARCH

LABORATORY

EVAPORATOR Low Temperat By-Product Re DRYFRS





REDLER Conveyors Move Cellulose Acetate with SPEED and SAFETY

Fast, safe movement, without contamination or spillage, at the lowest cost per ton is the achievement of this REDLER Conveyor System designed and installed by S-A. Automatic remote control operates the system, giving fast, convenient handling with maximum safety and economy. The logical, economical solution of problems such as this has been the continuous record of S-A engineers for fifty years. This half-century, bulk-materials-handling experience can be applied with great advantage to your own material movement questions.

S-A engineers will gladly consult with you, without obligation, but with the kind of experienced, versatile know-how that finds the right answers.



Cross section of standard Redler casing shows material moving in lower run flights returning, circuit-fashion, in upper.

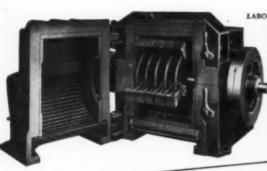
TENNESSEE EASTMAN COMPANY

Kingsport, Tennessee

Three horizontal REDLER Conveyors mounted overhead in parallel positions convey cellulose acetate from storage to weigh bins. Discharge outlets, gate-controlled, permit placing material in any selected bin. Bins discharge into mixers on floor below. Acetate flake dissolves to viscous solution from which "Eastman Acetate Yarn" and "Eastman Acetate Staple" are made. Material moved within enclosed casing of REDLERS is protected against contamination and spillage.

DESIGNERS AND MANUFACTURERS OF ALL TYPES OF BULK MATERIALS HANDLING EQUIPMENT





LABORATORY SWING-SLEDGE MILLS

Capable of reducing soft moderately hard and tough or of fineness between 1 in. and 20 mesh. The patented "Open-Door" feature permiss ready accessibility for cleaning.

STURTEVAN Laboratory Machines

Assure Quality of Products Fast - Economical - Accurate

LABORATORY IAW CRUSHERS BORATORY JAW CRUSHE! Special Roll Jaw action sim-plifies close regulation of the product with capacities vary-ing from 300 or 400 lbs. per hour at fanest settings, to 1000 or 2000 lbs. when opened for coarser work. Each part of the crusher is accessible for quick and easy cleaning.

LABORATORY CRUSHING ROLLS

CRUSHING ROLLS
First designed especially for laboratory sampling work.
Stutrevant Crushing Rolls are used regularly in many plants where there are limited outputs. Range of output for the Bx 5 size is from ½ in. to 20 mesh—and for the 12 x 12 size from \$\frac{1}{2}\$ in to 20 mesh.

LABORATORY SAMPLE GRINDER

BORATORY SAMPLE GRIN.

Laboratory Sample Grinders
are of the "Open-Door" disc
type and are capable of very
hne work, producing products
as fine as 100 mesh (coarset if
desired) when working on
dry, friable, soft or moderately
hard materials. Simply, urn
hand wheelesses the hard materials. Simply turn hand wheel to provide product regulation from 10 to 100 mesh.

The only sure way to maintain strict quality of products is laboratory control . . . and that calls for accurate sampling.

Sturtevant Laboratory Equipment meets the exacting requirements of laboratory work. They are fast and accurate . . . provide true samples.

Rugged and dependable, Sturtevant

of full size machines plus extra accuracy and wider range of adjustment. The "Open-Door" accessibility permits quick, thorough cleaning . . . prevents the possibility of previous batches from contaminating new samples.

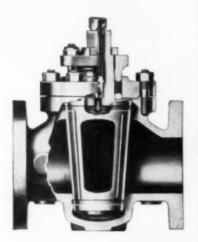
Investigate Sturtevant equipment for your laboratory. It will cut your sampling costs . . . help maintain strict quality of products . . . increase sales. Write for complete details and catalog.

equipment actually has all the features STURTEVANT MILL COMPANY

100 CLAYTON STREET, BOSTON 22, MASS.

Designers and Manufacturers of: CRUSHERS • GRINDERS • SEPARATORS • CONVEYORS • MECHANICAL DENS and EXCAVATORS • ELEVATORS • MIXERS

WALWORTH Lubricated



Plug Valves

for TOUGH assignments

where tight shut-off...
and easy operation
are "MUSTS"







Walworth Lubricated Plug Valves Offer These Advantages

- Complete surrounding of ports with resistant lubricant affords positive seal against leakage.
- Lubricant grooving system assures ease of operation tight shut-off greater protection against corrosion.
- Body and plug fully protected by lubricant from attack by line fluids.
- · Quarter turn opens or closes valve.
- Made in a complete range of sizes ½" to 26" and for pressures from 175 to 5,000 psi., and for vacuum requirements.

For handling petroleum products, natural or manufactured gas, acids, alkalies, solvents, slimes, slurries . . . in fact for almost any hard-to-handle liquids—there's a Walworth Lubricated Plug Valve designed for the job.

Easy to operate, tight sealing, resistant to wear and corrosion, Walworth Lubricated Plug Valves assure long years of dependable service at low operating cost.

Walworth Lubricated Plug Valves are available in sizes $\frac{1}{2}$ " to 26" for pressures from 175 to 5,000 psi., and for vacuum requirements. For full details—prices, sizes, dimensions, and other pertinent data, see your Walworth distributor or write to:

WALWORTH

valves • fittings • pipe wrenches 60 EAST 42nd STREET, NEW YORK 17, N. Y.

DISTRIBUTORS IN PRINCIPAL CENTERS THROUGHOUT THE WORLD



Safeguarding a fabulous fortune...



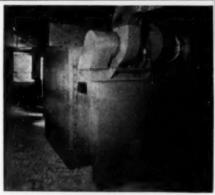
These three pictures are from the Samuel H. Kress Callection. The Stone Chimney Piece, a gift of Mr. & Mrs. W. Lawrence Saunders, in Italian, 16th century. At the right end of the fireplace is the painting "St. John the Evangeliei", by Piece of Cosimo, Florence, 1462-1321. The "Madonna and Child", by Jacopo Tatti (called II Sansovino), Venice, 1486-1570, is over the fireplace. The painting to the left-hand side of the fireplace is "St. Sebastian", by Raphael, Cattral Italian, 1483-1340.



Masterpisces from all over the world were assembled for the Philadelphia Museum of Art's 75th Anniversary exhibit. Founded in 1876, the Museum is now becaused in this eventeen-million-dollar yellow marble edifice. Typical of the priceless art treasures being protected by the Lectrodryer shown below is the corner of the Italian gallery shown at top.

WETth could cause irreparable damage to the priceless collection of paintings currently on exhibit in the Philadelphia Museum of Art. So the Museum guards against WETth (unwanted moisture) with a Lectrodryer* to maintain galleries at a constant humidity.

Your product is your fortune; if humidity threatens it, guard it with a Lectrodryer. Our engineers will work with you to design the protective system you need. Simply write Pittsburgh Lectrodryer Corporation, 303 32nd Street, Pittsburgh 30, Pennsylvania.



in Engined: Bitler, Limited, Tybern Hend, Erdington, Birmingham., In Australia: Birler, Limited, 51 Parrametta Road, Globe, Sydney. In France: Stein et Roubeix, 24 Rue Erlanger, Paris XVI. In Bulgium: S. A. Bulga Stein et Roubeix, 220 Rue de Moulin, Brussour-Lingu.

LECTRODRYERS DRY
WITH ACTIVATED ALUMINAS

LECTRODRYER



I thought A CATALYST SUPPORT was a crutch for a tottering tom . . . until I got the facts from Norton

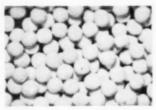
Now I Know:

A catalyst support, to more and more processing firms, means Norton ALUN-DUM* spheres, rings or pellets of such purity and chemical stability that they assure end products free from contamination. Their patented controlled structure, high refractoriness and abrasion-resistance promise you greater yields over a longer service life.

In particular, it may pay you to investigate Norton spherical catalyst supports. Made in diameters from ½" to ½", they provide you with such a uniform bed that channelling and pressure drop are reduced to a minimum.

Continuing research in catalyst supports is typical of the efforts Norton engineers are making to fit special refractories to your exact requirements.

So, if you have a high-temperature problem, complicated by chemical, electrical or physical variables, call in your nearby Norton refractories engineer. Or write to Norton Company, Refractories Division, 502 New Bond Street, Worcester 6, Massachusetts, Canadian representative: A. P. Green Fire Brick Co., Ltd., Toronto, Ontario.



NORTON CATALYST SUPPORTS can be supplied in CRYSTOLON®, MAGNORITE®, FUSED STABILIZED ZIRCONIA and MULLITE, as well as in ALUNDUM, compositions. Each has its own special properties as a catalyst support. Each has the chemical stability and purity that eliminate contamination of both catalyst and end product.



NORTON POROUS MEDIUMS are made of ALUNDUM (fused alumina) in a wide range of sizes and shapes in plates, fubes, discs, and diaphragms for filtration, diffusion, ceration and electro-chemical applications. Patented conrolled structure makes them uniformly porous. Highly resistant to acid and alkaline conditions.

*Trade-Marks Reg. U. S. Pat. Off. and Fareign Countries

NORTON Special REFRACTORIES

Making better products to make other products better

NORTON COMPANY, WORCESTER 6, MASSACHUSETTS

ALUMINUM DRUM STORAGE AT CELANESE CORPORATION OF AMERICA PLANT, BISHOP, TEXAS



WHY IS ALUMINUM BEST FOR SHIPPING

... glacial acetic acid, fatty acids, methyl salicylate, nitric acid above 95 per cent, hydrogen peroxide, essential oils, ammonium thioglycolate, and many other chemicals?

ANSWER: Because of aluminum's high resistance to corrosion and minimum tendency to contaminate or discolor chemicals.

Thus, aluminum drums and storage tanks will keep products at their best during shipment and storage.

And aluminum drums can take rough treatment! There's no glass to shatter, no

inside protective coating to break. They're made of corrosion-resistant aluminum throughout!

Kaiser Aluminum is sales agent for Benson Chemical drums. 63 sales offices and warehouse distributors in principal cities. Kaiser Aluminum & Chemical Sales, Inc., Oakland, California.



anese Corporation of America ships thousands of gallons of glacial acetic acid in aluminum drums to custom-



ALUMINUM DRUMS are light! Every time they're shipped and returned, you save on freight charges.



ALUMINUM DRUMS are re-useablewill last far longer than standard steel drums. And they stay rust-free and attractive with no maintenance.



YOUR NEAREST Kaiser Aluminum office, listed in the phone book yellow section, will give you immediate in-formation about chemical drums made of Kaiser Aluminum!

Kaiser Aluminum

Setting the pace . . . through quality and service

VELL VALVES requirements of the **CHEMICALS and PROCESS INDUSTRIES**

Fig. 2096 - Square Glass Sight Feed. Flanged ends. Designed and built for long service. Available in Bronze, Cast Iron, Steel and a variety of corrosion-resisting metals and alloys.

In addition to a complete line in Bronze, Iron and Steel, Powell can supply valves made in the greatest variety of Corrosion-Resisting metals and alloys ever used in making flow control equipment.



Fig. 2490-150-pound O. S. & Y. Gate Valve. Screwed ends. Supplied with precision-fitted, interchangeable solid or split wedges. Stem is interchangeapie solid or spitt wedges, stem is threaded and guided through a revolving bush-ing in the upper yoke, which has a compression lubricant fitting. Made in a wide variety of corrosion-resisting metals and alloys. Can also be furnished with flanged ends.



Powell Corrosion-Resisting Valves are made in these Metals and Alloys

Stainless Alleys 18-85 18.85 No. 18-85 Ch

25% Cr. 12% No.

No-result. Misco C Darimet 20 11.5-13.5 % Cr. Iron 18% Cr. Iron 28% Cr. Iron

PUMELL

Fig. 1944 - Large 150-pound "Y" Valve

with flanged ends, bolted flanged yoke-bonnet and outside screw stem. Available in a wide variety of corrosion-resisting metals and alloys.

> Aluminum Alcua No. 43 Moss No. B 214 Alcoa No. 61 S-T

Cast Irons

Cast Iron

31C Nickel Iron

Nickel and **Nickel Alleys**

Nickel Monel Metal® Inconel* Hastelloy Alloys? (A. B. C and D) Hours D 10

Bronzes Acid, Aluminum, Silicon

Everdur Herculoy Ampco ! Ampcoloy 11 90-10 88-10-2

Alley Steels

4-6% Cr. 5% Mo. 15% Nickel Steel 6-8 Cr. 5-.75 Mg 8 10 ° Cr 1 1-1 5 ° Mo.

Silver Hard Lead Molybdenum

*Registered trade-names of the International Nickel Co., Inc.

Registered trade-name of the Haynes-Stellite Co. 11 Registered trade names of Ampco Metal, Inc.



Fig. 1893-125-pound flanged end Gate Valve designed especially for Paper Mill Service. Body, bonnet and yoke are cast of 3'. Nickel fron; stem and screwed-in seat rings are of 18-8S Mo.; solid wedges are made of Ni-resist.

In Bronze, Iron, Steel and Corrosion-Resisting Metals and Alloys.

WHERE you get it ...

DOES make a difference



When you place your order with Barrett you're assured prompt, dependable service and top quality products, backed by 97 years of successful manufacturing experience.



Cresols Cresylic Acids Xylenols

Pickling Inhibitors Benzol

Toluol **Xviol**

Naphthalene Hi-Flash Solvent Phthalic Anhydride

Dibutyl Phthalate **ELASTEX* DCHP Plasticizer** Chlorinated Tar Acids "ELASTEX" 10-P Plasticizer "ELASTEX" 50-B* Plasticizer "ELASTEX" 28-P Plasticizer

> Phenolic Resins Niacin (Nicotinic Acid)

Pyridines Picolines Quinoline Lutidines

Tor Acid Oils

Neutral Coal-tar Oils

Coal-tar Creosote CUMAR* Paracoumarone

Indene Resin Carbonex* Rubber Compounding Hydrocarbon

Bardol* Rubber Compounding

Oil

Flotation Agents *Reg. U. S. Pat. Off



THE BARRETT DIVISION

ALLIED CHEMICAL & DYE CORPORATION 40 Rector Street, New York 6, N. Y.

CHEMICAL ENGINEERING-February 1952

EXTRA PROBLETS...

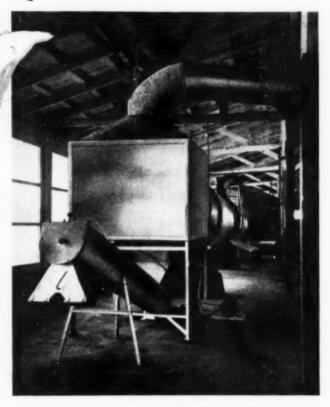
MODERN DRYING

for Example...

Douglas Warriner of Warriner Products Company writes: "... the Standard-Hersey dryer we purchased in 1940 has operated very satisfactorily through the years, dehydrating shredded sweet potatoes which are a by-product of our canning and shipping operations. The raw product upon entering the dryer has an average moisture content of approximately 72%. Moisture content of the dehydrated material ranges from 9% to 14%, averaging about 11%."

Whether your problem is the development of a more efficient method to dry your principal product or, like Warriner's, the recovery of a by-product which otherwise would be wasted consult Standard-Hersey.

Standard's unparalleled fund of dryer knowledge gained from more than 80 years of experience is at your command—PLUS advanced engineering techniques and dryer fabricating facilities second to none in America. For profitable drying, see Standard first.



Standard-Hersey Rotary Dryer which has been operating since 1940 in the Warriner Products Company, Inc. plant, St. Franciscille, Louisiana. Dehydrates shredded sweet potatoes (from culls and trimmings) — 1500 to 2000 pounds per hour. Operates 24 hours a day during 6-month fall and winter canning season.



Write for New 12-page Dryer Bulletin

Describes the more than 30 types of Standard-Hersey Dryers, Kilns, Coolers, and Calciners for every process industry need. Explains advanced "pillot" drying techniques to assure most economical selection of dehydrating equipment best suited to each individual product. Fully illustrated — Bulletin No. 508.



STANDARD STEEL CORPORATION

5005 Boyle Avenue, Los Angeles 58

123-S5 Newbury Street, Boston 16



FOR THE YEARS TO COME

When a big Petroleum Refinery and a major Pipeline Corporation needed a thoroughly dependable supply of low cost water they promptly ordered the installation of Layne wells and pumps. Their selection was based upon the proven efficiency, ruggedness of construction and the extra years of good service they could expect from Layne well water supply units. Very wisely they invested for the future.

Thousands of Layne well and pump installations ranging from one to twenty-five or more units, are giving outstanding service for cities, factories, railroads, dairies, chemical plants, packing houses, hotels, pipelines, refineries, air fields, army camps and naval stations. All were designed, built and installed complete by Layne's own engineers and field crews.

Layne enjoys the distinction of being the world's most experienced well water developers. No other organization has so much to offer those who are in need of well water supply units. Whether the requirements are for thousands or millions of gallons of water deily, Layne is ready to serve you. For further information address

LAYNE & BOWLER, INC. General Offices, Memphis 8, Tenn.

Layne offers a wide range of fully illustrated catalogs covering all phases of well water installations for all types of industry. Write for more information to



GET YOUR Filter Facts STRAIGHT

ON SHRIVER FILTER PRESSES

- Lowest in cost per square foot of filtering area.
- Versatile—can be used an any filferable material, no matter how heavy, thick or viscous.
- Recovers solids reasonably dry, firm, easy to handle.
- Clarifies perfectly, decolorizes, deodorizes, germproofs.
- Washes, extracts, to recover or remove soluble contents. Steams, melts or redissolves cake.
- Designed in any capacity, for any temperature and any pressure up to 1000 p.s.i.
- Made of any metal, wood, rubber, plastic for use with any filter media.

If the slings and arrows that are hurled at the head of the filter press were to find their mark, the poor old boy would have been a little-mourned corpse long ago. But strange to say, filter presses—and Shriver makes the major percentage of them—constitute the largest selling pressure filtration equipment in the process industries today and are likely to continue so for many years to come.

Despite claims for other filter types as to better filtering rates, faster operation, easier cleaning, etc., the facts prove the filter press a better overall investment, doing its consistently good job in more places on a greater variety of products under a broader range of operating conditions than any other filtering equipment ever developed. That's worth thinking about



STRAIGHT FACTS on Filtration

The new Shriver book serves as a valuable guide in selecting the right type of filtration equipment for improving your process and product. It tells—

- 1. How to Select Your Filter
- 2. How to Determine Type, Capacity, Construction
- 3. How to Determine Cost of Your Filter
- 4. Applications of Filters

MAIL TODAY

T	SHRIVER	4 0	OMPA	NY, Inc.	. 802	Hamilton	54.,	Harrison,	N.	1
	Send me	New	Shriver	Filtration	Book.					



from powdered materials

Fine iron of abrasion in dry ceramic materials can be a very serious matter, and that's exactly what the D. M. Steward Mfg. Co., of Chattanooga, Tenn. found out. Processing critical titanate materials, they found that the presence of iron caused a serious reduction in the electrical properties of the material. But how to get the iron out positively and economically?

The answer was the STEARNS Type "KB" Magnetic Separator, a separator designed specifically for removing fine iron from powdered materials. A compact, rugged unit, the Type "KB" is perfect for batch operations and color work. Unified electrical control assures complete protection against contamination at all times.

STEARNS SEPARATOR FOR POWDERED MATERIALS

- Positive, dependable separation
- · Low operating costs
- non-magnetic product
- · Easy to clean
- For batch and small capacity operations
- Continuous discharge of EXPERIENCE ENGINEERED to meet your requirements



629-South 28th Street, Milwaukee 46, Wisconsin

DO Your SPRAYS

Advanced design features a single round tangential inlet (instead of several small slots). Relatively large solid particles can pass right through and out the orifice. Produces a hollow cone spray with fine break-up and even distribution-ideal for many types of applications.



Available in Brass, Stainless Steel and Hard Rubber - or made-to-order in any machinable material. 1/4" to 1" I. P. S.

In many industries Monarch Spray Nozzles are used for:

ACID CHAMBERS AIR WASHING CHEMICAL PROCESSING COOLING PONDS DESUPERHEATING GAS SCRUBBING HUMIDIFYING OIL BURNERS SPRAY DRYING

Let us send you Catalogs 6A and 6C

MONARCH MFG. WKS.. INC.

2517 E. ONTARIO ST. PHILADELPHIA 34, PA

Available

for the first time ...

a Full-Color Sound Film



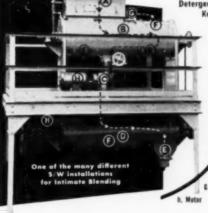
cientific schools and groups of designers, engineers, metallurgists and technical societies can now secure the free use of this fullcolor sound film, the first produced in the steel foundry industry. Available in 16 mm prints, the film is a 37-minute our of the modern plant of Lebanon Steel Foundry. The camera follows jobs from the blueprints on the project engineer's desk through steps of production to show, finally, a ew of the many important uses of Lebanon quality Steel Castings. Write for information on this exciting and educational film.

EBANON STEEL FOUNDRY Dept. F. Lebanon, Pa. In the Lebanon Valley

LOOK WHAT'S **NEW IN**

for Agricultural Dusts

Brake Lining Battery case formulas Dry plastering blends Enriched feed blends . Ceramics Plastic formulations Detergents • Dyes • Pigments **Kalsomine and Pigments** and many other fine powder blends



- a. Protective Brush Sifter
- c. High Speed Blending Mill
- d. Conditioning-Reservoir **Dust-Tight Packaging Valve**
- Rapid Access Panels
- g. Safety Vent Collars

When specifications call for powder blends of high uniformity, Sprout-Waldron's Intimate Blending Systems provide the perfect solution. Engineered to individual needs, these versatile systems are indicated wherever powders 100 mesh or finer are to be blended to smooth-flowing, lump-free uniformity especially formulas including liquids or fibers as well. Ruggedly constructed, the compact assemblies operate on the gravity flow principle and take up a minimum of floor space. They are misers on power consumption, too - are quiet, smooth-running, and clean. Dust-free operation is another vitally important S/W feature. Easy accessibility and simplicity of interior for cleaning, etc., assure advantages which have been developed through long practical experience. The minimum of moving parts means additional economies in maintenance.

Sprout-Waldron specialists have successfully solved intimate blending problems in a great many widely different processing plants from coast to coast. Their expert advice is yours for the asking. It may help step up production, improve your product and working conditions in the plant, and increase profits. Write for Bulletin I-846 today! Address Sprout, Waldron & Co., Inc., 15 Logan Street, Muncy, Penna.

MUNCY . PENNSYLVANIA

Aeromaster FANS CUT POWER COSTS



Aerodynamic design provides more cooling per horsepower

In every case where Koppers as Aeromaster Fans have been installed, power costs have gone down! Up to 10% less horsepower is required for Aeromaster... and that piles up power savings fast!

Koppers engineering makes this big difference between Aeromaster and ordinary industrial fans. Blade profiles are an adaptation of high-speed, top-efficiency aircraft propeller blades for higher safety factor and improved antiflutter performance.

Aeromaster Fans are available for any Aeromaster Fans are available for any and every sizable industrial cooling application. Standard models range from 5 to 24 ft. dis., with 4, 6 or 8 blades per fan. Capacities up to 750,000 c.f.m. Engineering service furnished for special low pressure propeller fan installation. Jales engineers available in all principal U. S. cities, as well as in Europe.

KOPPERS COMPANY, INC.

1	X	TODA	MAIL CO AY for DETA NFORM	COMPLETE
	**********			-/-
Asron	ERS COM souter Fans con St., B.			KOPPERS
Gentl	omen: Plo netion on	Acromas	me detaile ter Fens fr	
	nome and	type of eq	uipment to	be cooled)
Nome				
Title				
Coms	eny			

The Right Formula for a 'Positive Reaction' in the Handling of Bulk Chemicals

ELECTRIC VIBRATORS



Make Stubborn Materials Flow Freely

TUBULAR FEEDERS



Feed Pure, Dusty, Poisonous Materials Safely

FLAT PAN FEEDERS



Up To Hundreds of Tons Per Hour - Variable Control

VIBRATING SCREENS



Wet or Dry-Single or Multiple Decks

HOPPER LEVEL SWITCHES



Maintain Desired Amount of Material In Bins, Hoppers

Fast, Economical Handling of Most All Chemical Products ... Extremely Hot, Poisonous, Fine, Abrasive, Lumpy, Dry, Damp, Pure.

SYNTRON

MATERIAL HANDLING EQUIPMENT

Syntron Vibratory Equipment is easily adaptable to the many material handling applications found in chemical processing.

Electric Vibrators open up clogged bins, hoppers and chutes to free flow. Vibratory Feeders, equipped with a variety of troughs for different chemicals, feed from pounds to hundreds of tons per hour. Vibrating Screens remove foreign objects and lumps from powdered

chemicals—sizing chemicals in granule form.

Hopper Level Switches keep a constant level in hoppers handling dry chemicals not exceeding nut size.

Syntron Vibratory Equipment handle these many different operations easily and efficiently. No motors, bearings, gears, cams, idlers, etc. to wear and require oiling. Simple electromagnetic vibration does the job. They are available in different sizes and styles, from small to large models.

Write Now for FREE Catalog of Syntron Equipment

COMPANY



Y OU'LL lick your cold weather gage problems . . . and cut maintenance hours and costs way down . . . when you install Jerguson Heated Gages. You eliminate gage freezing and breakage, or you can speed up the flow of heavy, sluggish liquids . . . with these gages.

You don't need to insulate, or wrap the gages with tubing, for these modern Jerguson Heated Gages are a completely fabricated unit with built-in steam tracing.

Jerguson Heated Gages are built in both internal tube (illustrated) and external tube models . . in either reflex or transparent gages. They are available for the pressures you require, in a multitude of sizes, with tapped, flanged, welding socket or other connections.

Jerguson Steam Jacketed Angle Valves, #93 (and #93-U for close hook-ups), used with these heated gages, are available with ball check when required.

Both the gages and valves are available in special materials.

Write us about your problems. Send for new Data on Heated Gages.



Phone Listed Wader JERGUSON

Get 'Em from Your Jobber!

You can be sure your Pyrene* jobber will recommend the right extinguishers for your fire hazards—because there's a Pyrene for every fire hazard! Standardize on Pyrene, a symbol of quality since 1907.

•1.8. 84. U.S. PAL SE.



CARTRIDGE-OPERATED

New stainless steel shell—new low price. We annual recharging; no acid. For lines in wood, paper, Section, 256 ppl. size.

VAPORIZING LIQUID

World's best all-purpose extinguishers

Safe on electrical fines, effective on flammeble liquid fines. 2 | qt., 1 gal. (above) pressure-types.1 qt. (large illus-



AIR FOAM

Couple playpips to hose tine, Every 19 gals, of weter and 1 gal, of Pyrane Feem Compound yield 290 gals, of foom! For flammable liquids and ordinary combustibles.



CHEMICAL FOAM

25/ gal. size produces about 22 gals, of Sact-acting fram. I disal for flammable Securiors copier or stainless steal shell. (Pyrnes Sode-Acid also available in stainless steel or seamless copper.)

And other extinguishers. Also manual and automatic fire-fighting systems,

There's a PYRENE for Every Fire Hazard



PYRENE MANUFACTURING COMPANY

593 Belmont Avenue

Newark 8, New Jersey

Affiliated with C-O-Two Fire Equipment Co.

Thousands of facts to aid you in CHEMICAL PLANT

Engineering Operation Management

USE this set data - packed data - packed Mc-Graw-Hill books as a real time-and-work-saving tool . . . as an up-to-date library of manage-ment, engineering, and operating facts that can help you quickly solve every-day problems. Here thousands of clear, concise pointers on chemical cal-



culations, economics, unit operations, indus-trial chemistry and materials of construction.

McGraw-Hill CHEMICAL PLANT LIBRARY

5 volumes * 2359 pages * 975 illustrations JAMES A. LEE, Consulting Editor Prepared by a Staff of Experts

The fundamentals, methods, and data these books present are accurate, thorough, com-plete. The Library is the result of years of ex-perience with chemical plant problems, and the man who has it has the best.

Shreve's Selected Proc-ess Industries Plarce's Chemical Ea-glocering for Pro-duction Supervision Lee's Materiels of Cen-ical Process Indus-

tries
Clarke's Manuel for
Process Engineering
Calculations
Tyter's Chemical Englneering Economics

Gives You:

Gives Yea:

A cross section of
manufacturing procedures
Tested facts on 360
different chemicals
and foodstuffs
Bata to short-cut
process engineering
calculations Tips on the business side of chemical engineering On-the-job assistance in gaining peak efficiency

Ready reference in countless fields

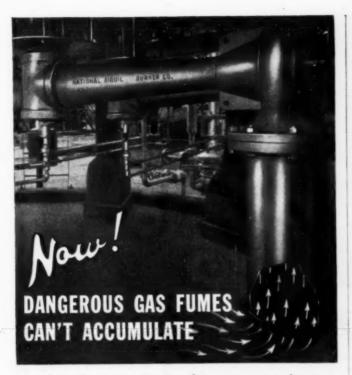
Turn to it for today's latest procedures in manufacturing . . . for clear instructions in operating . . for specific aid in selecting materials . . for tested design data . . . or for scores of practical business helps.

SEE IT 10 DAYS FREE
McGraw-Hill Book Co., Inc. 330 W. 42nd St., Naw York 26
Send me the McGHAW-HILL CHEMICAL PLANT LIBBARY. 5 rolumes, for 10 days examination on approval. If the books grove exits actor, 2 will result \$8.50 in 10 days and \$400 monthly butll \$27.50 in paid. Otherwise I will return books pontpaid. (Print) Name.
Address
City Zone State
Company
Position



Why be satisfied with "about right" agitators when you can select from the time-tested NETTCO line the exact agitating equipment to suit your needs. Nettco - in its fiftieth year - offers you the widest choice of horsepowers, ratios, types of drives, speed ranges, and accessories. The Nettco line is backed by a fund of agitating experience unequalled anywhere. Follow the example of many of the nation's leading process companies . . . make NETTCO your source for EN-GINEERED agitating equipment. Write, giving details on your process requirements. NEW ENGLAND TANK & TOWER CO., 87 Tileston St., Everett 49, Mass.





... They're consumed in our exclusive TANDEM COMBUSTION UNITS

NATIONAL AIROIL oil-gas Tandem Combustion Units for upfiring of petroleum heaters are now available with an additional "safety insurance" feature . . . and this same safety feature is easily adaptable to your present NATIONAL AIROIL Tandem Units.

Fuel gas passing through the venturi tube causes a "suction" which draws the beavier-than-air gas fumes into the burner. Consequently, dangerous gas accumulations are prevented by the normal burning process of the NATIONAL AIROIL Tandem Unit.

For vertical or horizontal firing, NATIONAL AIROIL oil-gas Tandem Combustion Units are widely popular throughout the U.S. and other countries.

Ask for details upon your business letterhead.

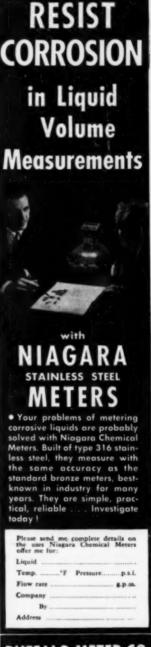
OIL BURNERS and GAS BURNERS for industrial power, process and beating purposes: STEAM ATOMIZING OIL BURNERS; MOTOR. DRIVEN ROTARY OIL BURNERS; MECHANICAL PRESSURE ATOMIZING OIL BURNERS; LOW AIR PRESSURE OIL BURNERS; GAS BURNERS; COMBINATION GAS and OIL BURNERS; AUTOMATIC OIL BURNERS, for small process furnaces and beating plants; FUEL OIL HEATERS; FUEL OIL FUMPING and HEATTING UNITS; FUENACE RELIEF DOORS; AIR INTAKE DOORS; OBSERVATION PORTS; SPECIAL REPRACTORY SHAPES.



CHEMICAL-PETROLEUM DIVISION

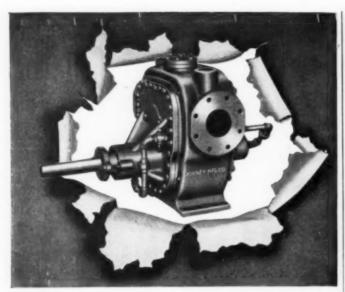
NATIONAL AIROIL BURNER CO., INC.

Main Office & Factory: 1235 EAST SEDGLEY AVE., PHILA. 34, PA. Southwestern Division: 2512 South Boulevard, Houston 6, Tex. INDUSTRIAL OIL BURNERS, GAS BURNERS, FURNACE EQUIPMENT



BUFFALO METER CO.

2893 MAIN STREET BUFFALO, N. Y.



One pump stands out!

Need a pump to handle asphalt, or glue, or molasses, or paint? Need a pump for grease, or acid sludge, or wax?

For tough jobs like these, one pump stands out-the Kinney Model SD Rotating Plunger Pump, Here's positive displacement pumping at its best . . . an extremely simple mechanism for pumping the most viscous materials that will pass through a pipeline!

Kinney SD Pump pulls to a 29" vacuum. Its openings are large and unobstructed. Its inner workings are free from valves, blades, springs, or complicated passages. The SD pumping action is smooth and sure . . . its output is so reliable that this Pump often serves as a combined meter and pump. Model SD Pump

dependable performance of the highest order.

Next time you have a pumping problem, bring it to Kinney. Our engineers will gladly show you how Kinney Rotary Liquid Pumps can solve your most difficult pumping problems. Send coupon for illustrated catalog. KINNEY MANU-FACTURING CO., Boston 30, Mass. Representatives in New York, Chicago, Cleveland, Houston, New Orleans, Philadelphia, Los Angeles,

San Francisco. Seattle, and foreign countries.

Kinney

KINNEY MANUE	ACTURING COMPANY		PUMPS
	TON ST., BOSTON 30,	MASS.	
	Juliatin ES1 describing Kinn	oy Liquid Pumps. My	liquid pumping prol
lem involves:		_	_
Acid Sludge	Lube Oils	Molasses	Tor
Asphalt	Edible Oils	Point, Enamel	White Lead
	T Foot Oils Birrel Oil	Read Oil	Others (see lette
Chocolete	Fuel Oils, Diesel Oil		

Leguesamentesamentesamente







Weigh-blending of chemical ingredients — the only accurate way to blend—calls for precision equipment and "know-how".

W&T Merchen Weigh Feeders meet the first of these requirements with these features:

- Feed and weigh in one operation
- Handle ounces to hundreds of pounds per minute
- · Manual or automatic control
- · Easy accessibility
- · Handy feed register
- Meet underwriters class II group G specifications

Your W&T Representative brings you the "know-how" from his experience in supervising and servicing hundreds of Merchen Weigh Feeder installations.

Write today for Descriptive Bulletins.

M-15

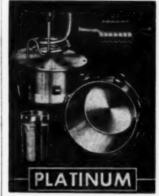
WALLACE & TIERNAN



PLATINUM

GOLD AND SILVER

for the chemical + metallurgical industries



Stills, Retorts, Electrodes and other Special Process Equipment to order.

Laboratory Wares of all description.

Sheet, Wire, Tubing, Gouze and Fine Fails.

Salts and Solutions

Platinum Metal Catalysts—Concentrated forms and on carriers.

Palladium, Iridium, Osmium, Rhodium

We pay highest prices for scrap platinum and have facilities for prompt recovery of spent platinum and pelladium catalysts.



Sheet, Foil and Ribbon, pure and in alloy. Seamless Tubing. Laboratory Apparatus and Process Equipment.

Karat Golds. Fine Gold Anades.



Fine, Sterling and Coin. Sheet, Wire, Cir-

cles and Foil. Fine Silver Anades. Rolled, Cast or in Shot forms.

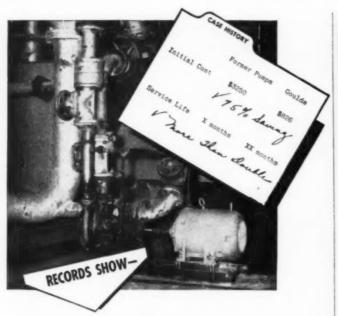
Silver Brazing Alloys and Fluxes for every industrial requirement.

WE INVITE YOUR INQUIRIES AND WILL SEND ON REQUEST FOLDERS: C-20, "Platinum, Gold and Silver for Science, Industry and the Arts" C-21, "Platinum and Palladium Catalysts".

THE AMERICAN PLATINUM WORKS



231 NEW JERSEY R.R. AVE., NEWARK 5, N. J.



How a manufacturer cut costs tremendously with Goulds stainless steel pumps...

When handling corrosive liquids, pumps alone can be an important item in your processing budget. One alert plant engineer in the southwest cut his pump costs to about an eighth of what they had been.

The pumps he had been using for an especially erosive crystaline slurry cost \$3250. When they wore out he replaced them with Goulds Stainless Steel Centrifugals for only \$826. But this tremendous saving in initial cost was only half the pay-off. The Goulds pumps have already been in service twice as long as the ones they replaced... and they're still going strong.

The advanced design and simple construction of Goulds pumps make these savings possible. Bearings are prelubricated and fully protected. Stuffing boxes are under suction pressure to prevent leakage and assure long packing life. Parts are interchangeable. The impeller clearance can be adjusted for wear. Available in 9 sizes with capacities to 750 G.P.M. Send us the coupon today for full details.





Address Zone State





Save Time, Tabor, Dollars!

VISCOSITY

As Simply, Quickly and Easily as Taking Temperature Readings

Just a flick of a switch, then read the Brookfield dial, and you have your viscoaity determination in centipoises. The whole operation, including cleaning up, takes only a minute or two.

Available in a variety of models suitable for extremely accurate work with both Newtonian and non-Newtonian materials, Brookfield Viscometers are portable and plug in any A. C. outlet — can be used in Lab, Plant or both

Write today for fully illustrated catalog showing Brookfield Viscometers adaptable to any viscosity problem from less than one to 32,000,000 centipoises.

BROOKFIELD COUNTER-ROTATING MIXER — Two concentric, oppositely rotating shafts, propeller equipped and driven by two motors, produce an annular flow and up to 48,000 acimorhike cuta/mutue. Enable exceptionally fast, effective and efficient laboratory mixing. Not a "mixrer." Write for Brookfield MIXER brochure.

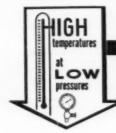




for any heat transfer application requiring



HORIZONTAL Dowtherm Vaporize



ASPHALT MELTING VARNISH COOKING AIR HEATING ROLL HEATING PLATEN PRESS HEATING CORE OIL PROCESSING FATTY ACID DISTILLATION ANIMAL FAT DEODORIZING VEGETABLE OIL DEODORIZING GAS DEHYDRATION OVEN HEATING

Gas, Oil or Combination Gas-and Oil Fired

VERTICAL

in 18 sizes,

30,000 to

-all these and many other processes requiring Fast, Controllable, Safe, Uniform Heat, are being done with



2,000,000 B.T.U.

Mc Kee Eclipse

WRITE FOR DESCRIPTIVE LITERATURE REPRESENTATIVES IN ALL PRINCIPAL CITIES

Eclipse Fuel Engineering Company 1121 BUCHANAN STREET ROCKFORD, ILLINOIS

The Most Complete Line of Cas-Fired Industrial Equipment on the Market

CHEMICAL ENGINEERING-February 1952



depend on CAMCO rugged long-lasting

stainless steel pipe fittings to solve your corrosion problems

All screwed Caps, Couplings, Plugs, Bushings and Unions up to and including 2" I.P.S. are machined from solid bar stock.

These fittings - sold at same price as competing 150 lb. cast fittings — can be used where working pressures of up to 1000 lbs. are experienced.

These stainless steel fittings are available in Types 304, 316 and 347.

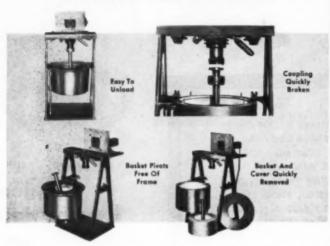
Write TODAY for the 1951 Cam catalog and price schedules!



5 Fox Stree	
lew Haven	13, Conn.
Please send	your lotest cotolog.
Pirm.	
Street	
City and Su	ria
By	

GET THIS PROOF

Rent An AT&M Centrifugal . . . See For Yourself How Centrifuging Can Benefit You



Are you missing the advantages of centrifuging? Do you know that in many instances AT&M equipment does away with settling tanks, filter presses, squeeze rolls, vacuum presses? That it is saving time, space and costs in processes involving chemical preparations-explosives-nitrating-acid wringing-ammonium sulphate-food products - soap - drugs, medicines, cosmetics-oils and greases-paints, varnishes—ceramics, brick, clay—fertilizers—nitrates—sludges—textiles -plastic bases?

Here's an easy, inexpensive way to prove to yourself exactly what centrifuging can do for you. Rent an AT&M laboratory model centrifugal. Then you can test your own materials and check the results. Ideal for laboratory or pilot plant operation, these machines develop centrifugal force comparable to full size equipment, providing you with accurate data for full scale production.

AT&M centrifugals are packed with AT&M-engineered design developments-for example: variable speed drive; perforate or imperforate baskets, rubber covered or in any machinable metal; fume-tight hoods for processing volatile liquids.

RENTALS COST LITTLE

You can rent a laboratory centrifugal from AT&M at a very nominal rate. If you later decide to buy, part of the rental fee will be credited against the purchase price. Write for particulars.

	oston 36, Mass,
Please send me my free co in the following processes:	by of the new AT&M booklet "Centrifugal Force." I am interested
	☐ Dehydration ☐ Clarification ☐ Coating ☐ Filtration ☐
Draining Thickening	mpregnation Sedimentation
ANY OTHER PROCESS:	
	Title
ANY OTHER PROCESS: Name Campany	Title
None	Title

SAVE TIME. SPACE AND COSTS WITH CENTRIFUGING

FOR INDUSTRY

COTTON TWILLS, CHAIN CLOTHS

for neutral solutions.

DURAKLAD FILTER FABRICS

for acid and alkaline solutions.

NYLON FABRICS

For mildew resistance and alkali solu-tions. Durable, and high, tensile strength

GLASS CLOTH

For high temperature and acid solutions

SARAN FABRICS

for hot corrosive solutions.

DUST COLLECTOR TUBES

catton, orlan, nylon Stantex All sizes to meet your specification

BLANKETS AND PRESS SACKS

Made to Order.

CENTRIFUGE LINERS

in cotton or Stantex.

Write for samples - Submit details

WM. W. STANLEY CO. Inc. 401 Broadway, New York 13, N.Y.

FRACTIONAL to 20 G P.M.

NEW POLYETHYLENE

ESPECIALLY DESIGNED TO HANDLE HC1, HF, NaOH, H.SO, DISTILLED HsO, FeC11, Ca(OH); and many

FLUID NEVER

TOUCHES METAL

Fluid only contacts outer surface of "FLEX-I-LINER"

PUMPS

WITH

HATURAL RUB BER, PURE GUM. BUNA, HYCAR

"Rex-i-liners"



VANTON NON-CORROSIVI plex-1-liner

PUMPS

NO STUFFING BOXES NO GASKETS

HO VALVES

HIGH VACUUM

SELF LUBRICATING

SELF PRIMING

PUMP CORP VANTON EMPIRE STATE BLDG. Dept CEX, New York, N.Y.



Wanted MECHANICAL ENGINEER

Engineers wanted for research and development work on dust collectors, fly ash precipitators, scrubbers and other types of air cleaning devices. Experience and interest in this type of work is desirable. Excellent opportunities. Employer is well established, progressive and expanding manufacturer. Seventy (70) years in Detroit area with plants in central states and on west coast. Modern plant facilities and offices, excellent working canditions and steady employment. Write giving full details—

P-3002, Chemical Engineering
520 N. Michigan Ave., Chicago 11, Ill.



AMERICAN Bitumuls & Asphalt

200 BUSH ST. - SAN FRANCISCO 4, CALIFORNIA

Providence 14, R. I. Perth Amboy, N. J. Boltimare 3, Md. Calumbus 15, Ohie St. Louis 17, Mo. Mobile, Ale. Baton Rouge 2, La. Tucson, Ariz. Inglewood, Colif. Oakland 1, Celif. Portland 7, Ore. Seartle, Wash, Washington 6, D. C. Son Juon 23, P. R.

THE SURE WAY TO Posts!



VOLUME OF WATER AT THE TEMPERATURE REQUIRED!

Here's the money-saving answer to hot water required for industrial needs. PICK Heaters provide hot water instantly - by steam injection. They're entirely automatic to provide

NO STORAGE TANKS NEEDED Compact design parmits in-stallation in corners, on walls or overhead.

EASILY CLEANED

No coils. Can be cleaned in a matter of minutes - without dismantling. Proved

BY PERFORMANCE IN FACTORIES . HOSPITALS DAIRIES . TANNERIES

and accurately maintain temperatures up to 180° F. The exclusive Pressurizer Piston stabilizes injection pressure eliminates pipe hammering and shaking. Available in seven sizes with rated capacities of 10 to 200 gallons per minute. Greater volumes can be obtained by multiple installations. Installation is simple, requiring only ordinary pipe connections.

Write for Engineering Details and Specifications Write Dept. CE-4

MANUFACTURES BY PICK MANUFACTURING CO. WEST BEND, WISCONSIN, U.S.A.

GAYCO CENTRIFUGAL SEPARATORS

GAYCO Separators, equipped with the adjustable centrifugal sizing fan—an exclusive GAYCO feature—make closer separations. Closer separations bring about higher production through efficient removal of the fines made by the mill. Closer separations bring about higher quality products by eliminating all undesirable

> "TIMKEN BEARING EQUIPPED" GAYCO brings you all these:



If you have an exceptionally hard separating problem TRY THE GAYCO

Universal Road Machinery Co.

Rubert M. Gay-Division

Factory and Laboratory, Kingston, N. Y.
NEW YORK 6, H. Y. 119 LIBERTY STREET

Canadian Representative: F. H. Hopkins & Co., Ltd. 8500 Decaire Blvd. Montreal, Que.



Advertising,

Advertising men agree—to do a complete advertising job you need the double effect of both Display Advertising and Direct Mail.

Display Advertising keeps your name before the public and builds prestige.

Direct Mail supplements your Display Advertising. It pin-points your message right to the executive you want to reach—the person who buys or influences the purchases.

More and more companies are constantly increasing their use of Direct Mail because it does a job that no other form of advertising will do.

McGraw-Hill has a special Direct Mail Service that permits the use of McGraw-Hill lists for mailings. Our names give complete coverage in all the industries served by McGraw-Hill publications—gives your message the undivided personal attention of the top-notch executives in the industrial firms. They put you in direct touch with the men who make policy decisions.

In view of present day difficulties in maintaining your own mailing lists, our efficient personalized service is particularly important in securing the comprehensive market coverage you need and want.

Ask for more detailed information today. You'll be surprised at the low over-all cost and the tested effectiveness of these hand-picked selections.





NEW YORK 18, N. Y.



or, as an inspection tool, for the large user. Covering I to 11 pH, it discriminates to 0.05 and is direct reading, self-contained and portable. The glass electrode is cleverly protected and the instrument, Type TF 889, may be either

An informative treat "Hurbourn Ione"

MARCONI INSTRUMENTS 23-25 Beaver Street, New York

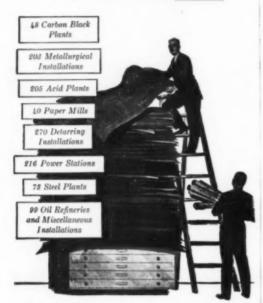
CANADA: CANADIAN MARCONI CO., MARCONI BUILDING, 2442 TRENTON AVENUE, MONTREAL ENGLAND: MARCONI PISTRUMENTS LIMITED, ST. ALBANS, HERTS.

line or battery operated.



All These Were Once

PROBLEMS, TOO



Your electrical precipitator installation will be individually engineered . . and based on the Research Corporation's experience graphically shown by that towering pile of thousands of blueprints.

This knowledge is a valuable asset that will help Research engineers "tailor-make" your Cottrell installation. For example, they can more quickly determine the right answers to such variables as the size, shape and type of both discharge and collecting electories.

trodes, their relative spacing, flue arrangements and many other factors. At Research you can count on profitable solutions to individual problems.

Typical One Day

Collections

6 TONS OF SODA SALT

AT A PAPER MILL

SO TO 100 TONS
OF CATALYST
250 TONS OF FLY ASH

10 TONS OF ARSENIC

In one chemical plant, for example, a Research Corporation Cottrell collects 5500 pounds of concentrated sulphuric acid every day. An informative booklet gives valuable information on this and other chemical plant installations. Write for your free copy.

80-117

RESEARCH CORPORATION

406 Lexington Avenue, New York 17, N. Y.
122 South Michigan Avenue, Chicago 3, Illinois

SMOOTH, SENSITIVE, TROUBLE-FREE and EXPLOSION-PROOF, too!



EBERT PLUNGER TYPE MERCURY RELAYS

Expanded production facilities have enabled us to maintain NORMAL DELIVERY SCHEDULES on these heavy duty relays handling up to 60 amperes.

EBERT MERCURY RELAYS

are now available in single, 2-pole and 3pole structures. Send for latest catalogue, Dept.





Heremetically scaled glass construction eliminates failure due to dust, moisture, oxidation...No contact points to burn, pit or strck...The liquid mercury-to-mercury contact provides years of positive, noisefree action...without servicing or maintemance casts.



EBERT ELECTRONICS CO.

Buy











YOU, TOO, CAN BENEFIT BY **SLY'S** KNOW-HOW

Over 100 different kinds of dusts are being collected with Sly Dust Filters. Thousands of installations are in operation—they collect all the dust.

Sly Dust Filters are used on such difficult dust as powdered sugar, beatonite clay, paint and pigments, aspirin and other pharmaceuticals, chemicals of all kinds, tale, lime, detergents.

Designed and engineered so that they save on space and power, Sly Dust Filters require less attention, less maintenance, yet—they are not expensive.

We offer you the benefit of 50 years' experience in solving all kinds of dust problems. Let us solve yours. A Sly engineer is near you. Ask for Bulletin 98.



THE W. W. SLY MANUFACTURING CO.

4771 Train Avenue • Cleveland 2, Ohle New York • Chicago • Philadelphia • Syracus Detroit • Buffala • Cincinanti • St. Louis Indianopolis • Birmingham • Los Angeles • Torento

Acress the face of the World a new reedom spreads . . . like a strong men's mile . . . a Freedom from heavy burdens . . . a freedom from beastly toil . . . A new freedom IN A WORLD divided by Iron Curtains and conflicting ideologies, it is refreshing to contemplate a better tomorrow made possible by a new-found freedom available to all—the Freedom from Toil, a Freedom springing from the use of modern machines. The Clark Equipment Company is proud to have contributed to the emancipation of the laboring man through the development and creation of machines to bear his most exhausting physical burdens. O Electric-Powered HAND TRUCK with Stocker. O TRUCLOADER with CRANE ☑ Itentic-Powered HAND TRUCK with Sincher. ② TRUCLOADER with CRANE
Affordment—1908 th. cap.—gas or electric power. ④ CLEVEPER with RAN
Affordment—2008 th. cap.—gas or electric power. ⑥ CARLOADER with
BAYEL Device — 3-4-5900 th. cap. gas or electric power. ⑥ YADDLIFF
with SHOYEL Affordment 4-4-6000 th. cap. gas power only.
④ WILLIEUE
with CLAMP Affordment 4-7-10,000 th. cap. gas or electric power.
⑤ YADDLIFF—150 with Standard Forks 15,000 th. cap. gas power only.
④ CLAKKTOR—100-10,000 th. daw bar paid. ⑥ CLAKKTOR—4100 the Company on level. ⑤ CLAKKTOR—210 conceive no level. ⑥ CL hauling capacity on level. O CLARKAY-42 to 58 tons hauling capacity on level. • TRUCTRACTOR-Dump model 4000 lbs. capacity. TRUCTRACTOR-Tip-model 4600 lbs. capacify. These Clark nelp you INDUSTRIAL TRICK BIVISION . CLARK EQUIPMENT COMPANY . BATTLE CREEK 9 MICHIGAN Mavie Digest [] Safety Saves Material Handling News ☐ Basic Facts this New Francism Firm Name

Zone

Chemical crass industrial face east, and stance statement in the con-



This new, low cost unit provides a fast, practical method of cleaning drums at petroleum bulk plants and terminals—eliminating the need for returning drums to the refinery for every refill. To every industry using drums which can be cleaned by petro-leum-based solvents, it offers a route to large-scale savings. One oil company expects actings of \$12,500 a year after installing a drum rinser and barrel filling equipment in a bulk plant kandling 2500 barrels annually.

Every inch of the interior surface of a drum is scoured in less than a minute...sand and similar substances are removed without draining. No piping of air lines is needed—just one electrical connection.

WRITE TODAY for prices and literature.

Gilbarco

Gilbert & Barker Mfg. Company West Springfield, Mass. • Toronto, Can. Here's

Why

it

Pays

You

to

Read

the

Advertising

The advertising is a rich source of valuable information. In this magazine it offers you ideas and products that may well apply advantageously to your business.

Every issue is a catalog of goods, materials, and services — quickly available to you—just for the reading.

Leaders in business and industry turn to the advertising because they've discovered it helps them run their businesses more profitably.

When you read all the ads in this magazine, the chances are good that you'll get a lead that will materially help you do a better job. For example, you may find a specific piece of equipment that will be a profitable time-saver. Or a tool that will increase worker efficiency. That's why it pays to read the advertising. It's good business.



McGRAW-HILL publications

MAGNETIC COUPLING

MAGNABOND A BASIC ADVANCE IN INSTRUMENTATION ... eliminates the stuffing box

Particularly suited for flow measurement or level determinations

The patented, separationproof MAGNABOND Magnetic Couplings are simple, safe, positive, and precise. They utilize a unique system of permanent magnets to pick up the float position of a primary element eliminating the need for stuffing boxes or packing glands.

After years of highly successful use with FLOWRATOR variable-grea flow measurment meters. the MAGNABOND coupling's usefulness is being extended to LEVELIMETER liquid level measurement instruments, V/A Cell Kinetic Manometer flow units, and Mercury Manometer flow meters.

For more information about the MAGNABOND coupling, its applications and possibilities, ask for Catalog 75 describing F&P Levelimeters: Catalog 37 on Mercury Manometer Flow Meters; Catalog 42 on V/A Cell Flow Meter units: Catalog 50, describing MAGNABOND Transmission and Exhibiting and Controlling Instruments for use with FLOW-RATOR Meters.

for MOLTEN SOLIDS INFLAMMABLES CORROSIVES AND OTHER DIFFICULT FLUIDS

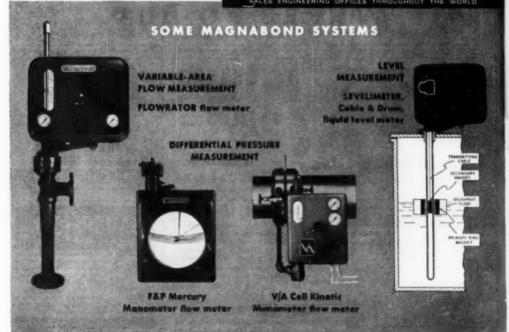
PROCESS CONTROL INSTRUMENTS

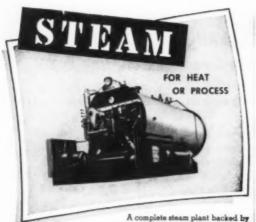


FISCHER & PORTER COMPANY

DEPT. 2M-98

HATBORO, PENNSYLVANIA, U.S.A.





Superior Steam Generators are manufactured in 18 sizes from 20 to 600 b.h.p. for pressures up to 250 p.s. er for hot water heating.

A complete steam plant backed by undivided responsibility • Shipped completely assembled • More than 80% thermal efficiency guaranteed • 4-pass design provides 5sq. ft. of heat-ing surface per b.h.p. • Built-in in-duced draft eliminates need of ex-pensive chimney • Simple installation Clean, quiet operation . Heavyduty construction assures long-lived dependability

For complete details, write for Catalog 322

PANDS COMMUNITOR INDUSTS

Factory Emmaus, Pa.

Esec. Offices: Times Bidg, Times Sq., New York N. Y.



LUBRICATION ECONOMY

LUBRIPLATE SAVES TMES ITS COST!



This remarkable saving was reported to us by the Wolver-ine Shoe & Tanning Corpo-ration of Rockford Michi-gan, Their unsolicited letter stated-"For every dollar no pay for LUBRIPLATE Lubeicant No. 100 we save \$7.00 in chain replacements". You, too, can enjoy the savings made possible with LUBRI-PLATE Lubricants.

- 1. LUBRIPLATE reduces friction and wear
- 2. LUBRIPLATE prevents rust and corrosion
- 3. LUBRIPLATE is economical to me

Write today for case histories of savings made through the use of LUBRIPLATE in

LUBRIPLATE DIVISION Newark S. N. J. Folodo S. Ohio

The Different

DEALERS EVERYWHERE, consult your Classified Tele

WHERE TO BUY

Featuring additional Equipment Materials, Supplies and Service for the Process Industries



W. P. HEINEKEN, Inc.

Engineer & Manufacturer

DRYERS

For all purposes

50 BROAD ST. New York, N. Y.



WEIGH MATERIALS WHILE CONVEYING

MERRICK WEIGHTOMETER

MERRICK SCALE MFG. CO. 171 SUMMER ST., PASSAIC, N. J.

CHEMSTEEL CONSTRUCTION COMPANY, INC. 501 Chamsteel Bldg., Walnut St., Fittsburgh 32, Fa.

Send data on Engineering & Construction facilities for ACID-ALKALI-PROOF CONSTRUCTION of processing & storage tanks & flooring

COMPANY

CITY......ZONE.....STATE.... ********

ACID TANK LININGS

- Applicators of B. F. Goodrich Rubber and Koroseal Linings, Metal Spraying. Synthetic Paints, AMERCOAT Plastic Coatings. Also, specialists in Welding, General Machine Work, Sandblasting.
- · We are equipped to give you efficient service in the field or in our plant.
- Your inquiries are cordially invited.
 Request Corrosion Protection Bulletin.

METALWELD, INC.

2600 Hunting Park Ave., Phila. 29, Pa.

alkalias in steel mills, chemical plants and ng industries. Send blue-prints so we may recommend proper to use. Write for latest catolog TRIAL ORDER

FOR ACID AND ALKALI USERS

ons for moking com- \$7.50

isen Cements Company - Pittsburgh 15 Pa

PROFESSIONAL SERVICES

REPORTS

PLANT DESIGN INVESTIGATIONS

TESTING

GENERAL CONSULTING

MANAGEMENT

TRANSLATIONS

CHEMICAL AND BACTERIOLOGICAL ANALYSIS

R. S. ARIES & ASSOCIATES

Chemical Engineers & Economists
COMMERCIAL CHEMICAL DEVELOPMENT
Process Analysis - Market Research
Process of Proceedings
Design & Initial Specialist of Complete Flants
Licensing of New Processe & Products
New Product Development
460 Madison Ave. EL-6-199 New York IT, N. Y.

INTERNATIONAL ENGINEERING COMPANY INC.

Engineers

Investigations — Reports — Design Procurement — Field Engineering Demostic & Foreign 74 New Montgomery St. San Francisco 5, California

GUSTAVE T. REICH

Consulting Chemical Engineer

DEVELOPMENTS — OPERATION CARSOHYDRATES INDUSTRY BY-PRODUCTS CARBON-DIOXIDE — WASTE DISPOSAL Packard Building Philadelphia, Pa

W. L. BADGER

CONSULTING CHEMICAL ENGINEER Evaporation, Crystallization, and Brat Transfer; Complete plants for salt and caustic soda; Complete Dowthern installations.

2015 Noneth State Street

Ann Arbor, Mich.

GEORGE H. KENDALL

Consulting Mechanical Engineer

Cost Reduction Studies; Process or Product.

Robusta Existing Products for Greater Profit.

Robusta Existing Products for Greater Profit.

Robusta Existing Products for Greater Profit.

Robusta Existing Products for Service Studies.

New Products & Process Registering Studies.

P. O. Box 2 (**But. 1923) Tel. Darles 5-1546

Novicon Heights.

SANDERSON & PORTER

Engineers and Constructors

New York ◆ Chicago ◆ San Francisco

J. PAUL BISHOP AND ASSOCIATES

Consulting

Pood and Chemical

Specializing in: Description of New Joseph and Engineering of New And Moderations of 64d Pool and Chemical Plants and Processes.

Write F. O. Box 348

Blinot-

KNOWLES ASSOCIATES

Hugincers

Consultation - Design Complete Plants — Equipment, Heavy Chemicals — Ore Dressing 19 Rector Street New York 6, New York Bowling Green 9-3456

J. E. SIRRINE COMPANY

Engineers

Plant Design & Surveys covering Chemical, Electronhemical and Metallurgical Production; Trade Waste Disposal; Water Supply & Treatment; Analyses & Reports. Greenville - - - - - - South Carolina

CARL DEMRICK

Technical Translations

Send for Circular

53 So. Broadway

Yonkers, N. Y.

KOHN & PECHENICK

Consulting Chemical Engineers

Plants - Process - Equipment DESIGN Reports Trouble-Shooting Appraisals 262 Huron St. Resolding 22 N V

MARCUS SITTENFIELD

Consulting Chemical Engineer

Piants - DESIGN - Equipment Economic - SURVEYS - Technical 'rosso - DEVELOPMENT - Product Registered Professional Engineer 1411 Walnut St. Philadelphia 2, Pa.

RICHARD F. ENNIS, JR. Consulting Chemical Engineer

Engineering and Economic Studies

Dosign - Development - Research

Lincoln-Liberty Bidg.

Philadelphia 7, Pa.

JACKSON D. LEONARD

Consulting Chemical Engineer

Cost Reduction Programs for the Process Industries Maintenance Programs — Utility Conservation Suggestion Systems — Cost & Economic Analysis Process Design — Process Improvement

FOSTER D. SNELL, INC.

Research Chemists and Engineers
A staff of 75 including chemists, sugineers, bactoriogate and medical personnel with 16 stories
of laboratories and a pitor plant are available for
the solution of your chemical and cagineering
problems.

Write teday for Booklet No. 3

"The Chemical Consultant and Your Business"

20 West 15th St. New York 11, N. Y

EVANS RESEARCH AND DEVELOPMENT CORPORATION

Organic and Inorganic Chemistry Processes-Products

950 Past 42rd St.

New York 17, N. V.

C. L. MANTELL Consulting Chemical Engineer

Process Research and Engineering Development

457 Washington Street

New York 13, N. Y.

Metuchen, N. J.

NICOLAY TITLESTAD CORPORATION

Chemical Engineer

Design — Consultation — Complete Plants suiphing acid — phosphoric acid — suidation of ammonia altrores products — acid concentration surplus districts — — to arbon bisulphide 11 W. 41m Street, N. Y. 18 PR-6-690.

FRASER-BRACE

ENGINEERING CO., INC.

During Supineers & Constructors

Hydro-electric Developments

Metallurghose and Application Plants

Chemical & Process Industrics

Metallocade — Tunnels — Port Facilities

10 Eart 40th St., New York 19, N. T. & 2x2-3570

MELVIN NORD, DR. ENG. SCI., LL.B.

Consultant in Legal and Technical Problems REGISTERED PROFESSIONAL ENGINEER PATENT ATTORNEY

New York 13, N. Y. 457 Washington Street

THE J. G. WHITE ENGINEERING CORPORATION

Design - Construction - Reports - Appraisals 80 Broad Street, New York 4

Knowledge plus Experience . . . always a vital asset-

When you are in need of expert advice to be applied to solving your particular problems, save TIME and COST by calling in a specialist.

These consultants have broad experience in management services that can be invaluable to you.

It pumps... it PAYS!



SAVINGS are the first of many pleasing dividends paid by the easy-working simplicity of the new Neptune Chemical Apportioning Pump. Here is a modern, streamlined pump that is not costly... ready with finer feeding controls for boiler feedwater treatment. And the motor eliminates old "headaches" because it is easily serviced or replaced with standard parts that are readily available in any city; also, an available unused motor can be readily utilized and applied to the Neptune Drive. Write for interesting bulletin. Neptune Pump Mfg. Co., 4912 N. 6th St., Phila. 20, Pa.

Neptune pumps

for Chemical Apportioning

STOP VALVE LEAKAGE ON ANY FLOW!



SHOWER CO. tion on request.

SARTELL.

MINNESOTA

(Made In Sheffield, England By Millspaugh, Ltd.)

-SEARCHLIGHT SECTION.

CHEMICAL ENGINEERS

Technical graduates for process design, chemical engineering calculations, selection of equipment, specifications, and other process activities.

Also need chemical engineers with experience on instrumentation.

Replies will be held confidential

M-29, P. O. Box 3495 Philadelphia 22, Pa.

PRODUCTION SUPERVISION

Rapidly stpanding, medium-size company engaged in chemical, rubber, and planties operations has soweral greduction supervisory openings with excellent potential for advancement. Engineering dagree necessary, Business Administration training and/or industrial experience desirable.

P-2160, Chemical Engineering 330 W. 42nd St., New York 18, N. Y.

CHEMIST OR CHEMICAL ENGINEER

To work on a plant manufacturing commercial high explosives. Experience useful but not essential. State age, training and qualifications. Write to

NATIONAL POWDER COMPANY

REPLIES (Box No.): Address to office secrest you NEW YORK: 336 W. 42nd St. (36) CHICAGO: 538 N. Michigan Ave. (21) SAN FRANCISCO: 68 Post St. (4)

POSITIONS VACANT

ENGINEER—Gales Position with responsibility in an established organization selling high quality testing and control equipment for heavy chemical, paper, and forest products industries. Frefer graduate mechanical, electrical or chemical engineer, aged 26-36, in good health with established sales experience, Location—Pacific Northwest. Position requires and rewards integrity, energy and individual initiative. Reply to P-392: Chemical Engineering, giving expeptotograph for strictly confidential use. Interview can be arranged.

ENGLAND. Corrosion Chemist required conversant with Metallic Corrosion and Treatments. Must be experienced. Applicants must submit full curriculum vitae and state salary required. Good prospects for permanent position. Box 18736. Urbach International Advertising, 63, Lancaster Grove, London N.W. 3.

PAPERMAKING OR Chemical Engineering graduate 23-40 years old with 5-7 years' technical experience in paper or paperboard. Man selected will be responsible for supervision of testing laboratory and process development and converting plant. Ralary commensurate with experience. Excellent advancement opportunities. In replying, give complete background of education, experience and salary repulsions, along with recent photograph. P-210. Chemical Engineering.

PRODUCT DEVELOPMENT Engineer Wanted
—Must have good technical education background, preferably in Engineering or Architecture, with practical experience in insulations,
coatings and adhesives. Must be willing to
travel. Liaison activities between Research and
Sales in a progressive and well-known insulation manufacturing corporation. P-3248. Chemical Engineering.

(Continued on page 468)

SALES ENGINEER

Represent Nationally Known Manufacturer

Metal and Wood Laboratory Furniture

FOR SCHOOLS, HOSPITALS, INSTITUTIONS AND INDUSTRIAL LABORATORIES. EXPERIENCE IN ALLIED LINES ACCEPTABLE. NO OBJECTION TO NONCOMPETITIVE LINE. STRAIGHT COMMISSION. INTERVIEWS ARRANGED IN YOUR CITY, STATE FULL PARTICULARS IN FIRST LETTER.

SW-3319, Chemical Engineering 330 W, 42 St., New York 36, N. Y.

MANUFACTURERS' REPRESENTATIVES

Well established manufacture of Chemical Kraportors seeks askee engineering firms as representatives in various parts of the U. S. and Cunada. Only firms with experienced engineering personnel who are welling chemical plant equipment in definite territories will be given preference. SW-3129, Chemical Engineering 330 W. 42nd SR. New York 36, N. Y.

SALES ENGINEERS

Chemical or Mechanical, Openings for mon with taperience in filter design and operation, hear transfer, equipment, and oil dewaxing equipment. Reply should include personal data, resume transference, photo if available, and telephone number. Our enzioneck now of this advertisement.

P-3165, c/o Chemical Engineering 330 W. 42 St., New York 36, N. Y

WANTED

TECHNICAL EXPERT

Thoroughly experienced in the manufacture of assein and gelatin. All inquiries confidential.

P-3338, Chemical Engineering 230 W. 42 St., New York 36, N. Y.

ENGINEERS Chemical - Mechanical - Piping - Process

Long term openings in permanent offices located at Cleveland. Ohio and Frederick, Maryland offering good salary plus overtime (forty-eight hour week) for qualified Engineers, Group Leaders and Designers experienced in one or more of the following phases of localistrial plant design:

OF ISSULATION PROCESS PIPING INSTRUMENTATION PROCESS EQUIPMENT LAYOUT PACKAGING OF PACKAGING AND VESSELS TANKS AND VESSELS

GOILER HOUSES
PLANT LAYOUT
CONVEYORS
HEATING AND VENTILATION
SPRINKLERS
WATER TREATMENT

Limited number of openings for Estimators experienced in Mechanical and Chemical installations as well as building construction.

Also have a number of openings in our Cincinnati and New York City offices for similar

Asso save a number of openings in our Cincinnati and New York City offices for summer type personneling conditions with paid vacations, sick leave plan and participating Group Insurance Program.

Please submit complete resums stating experience, education, salary required and date available to:

The H. K. Ferguson Company

Ferguson Building

Engineers and Builders
Cleveland 14, Ohio

CHEMISTS AND CHEMICAL ENGINEERS

Thinking of Changing Jobs?

We're not an employment agency, but clients of ours have some challenging jobs open in Research and Development — perhaps the opportunity you are looking for. They don't promise the world; they know, just as you do, that the right man, right job, and work, all team together to insure a sound future for the company and for you.

If you are interested in a future in research and development, why not eall or write us and tell us something about yourself? No obligation and obviously confidential.

ROGER WILLIAMS, INC.

Economic Studies • Market Research • Public Relations 148 East 38th Street, New York City 16 • MUrray Hill 5-6508

SALES ENGINEER

Midwestern Conveyor Manufacturer has attractive position for a mechanical or chemical engineer. Conveyor sales or application experience in the chemical and power plant field required. Write complete qualifications in first letter, including present compensation and salury expected. Send recent snapshot.

P-2007, Chemical Engineering 520 N. Michigan Ave., Chicago 11, Ill.

MANUFACTURER'S REPRESENTATIVES

Leading manufacturer of Industrial Dust Collection and Dust Recovery Equipment requires representation in the Boston, Portland, Maine, New Haven and Pittsburgh areas.

Please provide rull details in first letter: experience, financial status, present products now handled. Address reply

RW-3160, Chemical Engineering 330 W. 43 St., New York 36, N. Y.

VISCOSE ENGINEER

National organization seeks capable graduate engineer with experience in viscose rayon manufacture or related experience. Headquarters New York. Salary open.

Send complete resume including age and salary data Box CE 698, 221 W. 41 St. New York City 18, N. Y.

OPPORTUNITIES FOR EXPERIENCED TECHNICAL PERSONNEL

im

ATOMIC ENERGY INSTALLATIONS

Oak Ridge National Laboratory

Electromagnetic Separation Plant Oak Ridge, Tennessee

Gaseous Diffusion Plants
Oak Ridge, Tonnessee and Peducah, Kentucky

ENGINEERS

DESIGN-DRAFTING — chemical plants, structures, piping, valves, utilities, alterations.

LABORATORY - research and development.

POWER—design, testing, construction of large electrical power generation and distribution installations.

MACHINE DESIGN-jigs, fixtures, gadgets, remote control equipment.

PROCESS—chemical process and equipment design, vacuum or high-pressure systems, pilot plant and production operation.

CONSTRUCTION—plant design, specifications, sub-contractor liaison.

SAFETY-pressure vessel inspection and fire protection.

NUCLEAR REACTORS design, development, construction, testing.

INSTRUMENTATION — design development and industrial application of electronic and pneumatic instruments.

INDUSTRIAL AIR-CONDITIONING AND REFRIGERATION — design of plant systems.

CHEMISTS, PHYSICISTS, METALLURGISTS

Research, development, and production in nuclear technology, greeous diffusion, and related fields.

Minimum educational requirement— B.S. degree, or its equivalent.

> Salary commensurate with training and experience

Give experience, education, age, references, personal history, salary received and salary expected.

Central Technical Personnel Office

CARBIDE and CARBON CHEMICALS COMPANY

a Division of

UNION CARBIDE AND CARBON CORPORATION

Post Office Box P Oak Ridge, Tennessee

SEARCHLIGHT SECTION

(Continued from page 466)

SELLING OPPORTUNITIES OFFERED

CHEMICAL ENGINEERS. We will provide a well-rounded training in our New York plant in technical sales, design, and development, cading to sales and service to the sales and service provided to the sales and service with the sales and service with the sales and service with the sales and service to the sales and service to the sales and service to the sales and the

SALES REPRESENTATIVE. Established Mid-West manufacturer of corrosion proof equip-West manufacture of corrosion proof equip-ment desires a manufacturer's representative in the Chicago area. Experience accessary sell-ing Chemical Industry. Financial aid available to right party. State experience, education and other lines bandled. RW-3250, Chemical Englneering.

EMPLOYMENT SERVICES

SALARIED POSITIONS \$3,500 to \$35,000. We SALARIED POSITIONS \$2.00 to \$23,000 we offer the original personal employment service (os in the personal employment service) for the personal requirements. Identity covered; presented to the personal requirements. Identity covered to the personal requirements and the personal requirements are personal requirements.

SALARIED PERSONNEL \$3,000-\$25,000. This confidential new ico established 1927. Is confidential region established 1927, is geared to needs of high grade men who seek a change of connection under conditions assuring, if employed, full protection to present position. Send name and address only for details. Personal consultation invited. Jim Thaves Low Personal consultation invited. Jira Thayer Jen-nings, Dept. B. 241 Orange St., New Haven, Conn.

POSITIONS WANTED

CHEMICAL ENGINEER, registered Ohio, 13 years industrial experience, research, development, production, sales domestic & export. Age 24, married, protestant, member A.C.S. & A.I.Ch.B. Seeking association with small or medium size organization needing man to assume major responsibilities. Wish to acquire interest in business. Currently employed New York City, Will more, PW-8592, Chemical Engineering.

CHEM.MECH. Engineer (BSE-MS), with initi-ative, desires responsible position. Prefers pengla to a side-rule. Ten years experience: da-vicoment, design, production, and sales in the plastics rubber, chemical, and alreraft indus-tics. Write: 1122 Beech St. South Pasadens.

SALES ENGINEER—twelve years equipment sales and managerial experience metropolitan New York Area on useful fabrication, mixing equipment, complete process plants. Desires position New York Blatrict Manager, PW-321, Chemical Engineering.

GRADUATE CHEMICAL Engineer now employed as geophysicist desires permanent position preferably is production. No. Ch. E. experience. Age 25. married, and veteran, PW-3148. Chemical Engineering.

DEVELOPMENT - OPERATIONS - Tech. Ser. Ph.D., wide exp. deter. organ., design, super-vision, radio-chem. Personable, efficient. PW-331, Chemical Engineering, Chicago 11, III.

INSTRUMENT MAINTENANCE or Engineer-ing, four years experience rayon plant. B.S.M.E. PW-3332, Chemical Engineering.

QUALIFIED CHEMICAL Engineer desires to relocate. Have extensive technical knowledge and onough leadership to headle plant personnel. Would like to do engineering but have experience mostly in production. I am making 55,000 a year and would like to do as well but located in the West of Southwest. If your plant needs someone with lots of experience the plant production of the plant plant production of the plant plant production of the plant p

CONTRACT WORK

Custom Grinding—Well-established company in New Jerney offers facilities for fine grinding for the state of the state of the grinding and grain forms. Specialists in hazardous prod-ucts. Packing, mixing, and shipping facilities available. CWW-2418, Chemical Engineering.

PATENTS

CONSULT: Z. H. POLACHEK.
Reg. Patent Attorney. 1234 Broadway, New
Tork I. N. Y.

DESIGN ENGINEER SAN FRANCISCO AREA

Engineering graduate, Registered M. E., experience in chemical, petroleum or related plant process equipment and piping design. Replies confidential.

> Permanent SALARY OPEN

THE DOW CHEMICAL COMPANY

351 Pittsburg, California Attention: R. B. Ralph P. O. Box 351

ENGINEERS

Many engineering positions of challenge for men of proven caliber. Best salaries! Good opportunities for Metallurgists!

"Many jr. positions"

Call, write or wire: GLADYS HUNTING

DRAKE PERSONNEL
("bloage I, III 7 W. Madison Sc

AVAILABLE CUSTOM REFINING FACILITIES

WANTED · All Types of Crude Mixtures · By-Products, Residues, Wastes Contaminated Solvents

Drum Lots-Tank Cars

TRULAND CHEMICAL & ENGINEERING CO., INC.

Box 426, Union, N. J. UNionville 2-7340

PLANT FOR SALE

Nework, N. J. Three-story brick building 71,500 sq. ft. Brick gurage 10,000 sq. ft. Buildings—sprinkler throughout—2 freight its vectors—beating system—louding dock 185 ft.—yard 6,000 sq. ft. 3 steam engines 185 ft.—yard 6,000 sq. ft. 5 ft. 5 ft.—yard 6,000 sq. ft. 5 ft. 5 ft.—yard 6,000 sq. ft. 5 ft.

BO-2771. Chemical Engineering 330 W. 42 St., New York 36, N. Y.

CHEMICAL PLANT WANTED

We are now manufacturing over \$20,000,-000 in various lines and wish to expand by ocquisition of assets or stock of one or more industrial companies. In our negotiations the sellers' problems and wishes will receive full consideration. Present personnel will normally be retained.

Address all replies

"Confidential" C. J. GALE, Sec. 233 Broadway, N Y. 7, N. Y.

WANTED METAL-SCRAP **Buyers** of

OPELL METAL ASSOCIATES
New York 17, H. Y.
Wilrray Hill 3-3421-2-3



FOR A QUICK SALE OF IDLE MACHINERY

We are ready to buy

Dryers, all types Filter Presses Mixers Pulverizers Pulverizers
Evaporators, Stills
Columns
Roller Mills Screens & Sifters
Packaging Units
Reaction Kettles
Jacketed Kettles
Rotary Filters Rotary Filters
Storage Tankage
Hydraulic Presses Flakers S/S Tanks & Kettles

· Send us your list Single items to complete plants

READY FOR **OUICK DELIVERY**

FILTERS & FILTER PRESSES

- 1—Shriver, iron steam heated, 30" x 30", 30 chambers.
- 4-Shriver & Johnson, 30 x 30 iron plute and frame, 35-40 chambers each.
- l—8' x 12 Oliver Lead-Wood Vacuum Filter Acid-Resisting.
- 3-Oliver Vocuum Filters, incl. 8 x 12' 11'6 x 14' 11'5 x 18'.
- 2—ALUMINUM Sperry FILTER PRESSES: 1—30" x 30" 45 chambers, 1—34" x 24" Plate and Frame, 24 chambers,
- 1-212 Sweetland Filter 36 leaves on 4" 1-Kilby 39 x 39 Cl Filter Press open de-
- 1-25 Sweetland, Stainless Steel Lined with 39 stainless steel leaves on 2" centers.
- Shriver 42" x42" Filter Press with 50 plates and frames, corner feed; wash type: open delivery; with hydraulic closure.



Additional Plant For Sale Advertising on page 475, Wanted Advertising on page 476.

LIKE SWEET MUSIC . . .

"CONSOLIDATED"



DRYERS.

- 1-3' x 28' MONEL shell hot air Dryer, saw tooth flights, steam coils, etc.
- 1-5'8" x 24' Direct Heat Botary Dryer or Botary Kiln, welded shell.
- I—7' x 78' Louisville Type L. Indirect-Direct Heat Botary Dryer.
- 4—Buflovak 5' x 12' double drum Dryers.
- 1—Devine #7 Vacuum Shelf Dryer, 13 shelves 40 x 43. 2—Bullovak Double Drum Dryers 32" x 90" complete with statisless steel accesso-
- ries.

 1-Devine Botary Vacuum Dryer, 2' x 8', also 5' x 23'.
- alse 5' x 25'.

 2-Buflovak Vecuum Drum Dryers, 5' x 10' with all accessories.
- I-6 x 50 Leuisville welded shell Rotary Steam Tube Dryer with two rows, 54 tubes. Also two 6' x 27' Davenport same
- type.

 3-P. Devine Double Door Vacuum Shelf
 Dryers: each equipped with 20 heated
 welded shelves, 59" x 78" pumps and
 ivudanters.
- 1—P. J Stokes 14 shelf, 44" x 44" Voruum Shelf, Dryer with vocuum pump and condemer, etc.
- 2-5' x 40' Ruggles-Coles Direct Heat Rotary Dryers.

STAINLESS STEEL CENTRIFUGALS

2—42" All Stainless Steel Centrifugals.

Amer. T4M Co. with 5/8 basket, curb.
casing, shortl unloader and 46 H.P. vazichle speed Slip Ring 2/60/449 V 1200
RPM motor with full controls. Suspended
bottom discharge type. Now at Newark.

A STRIKE!

MONEY

TO

SPARE!

When

You Buy

from Consolidated

EVAPORATORS

- 1—Swenson triple effect Evaporator, horizontal copper tubes, total 1320 sq. ft. H.S. Now installed and complete with supporting steel condenser, pumps, piping, etc.
- Also used as Finishing Pan-
- 1—Swenson single effect Evaporator, copper tubes, 440 sq. ft. H.S. with supporting steel condenser, pumps, piping, etc.

MIXERS

- 4—Baker Perkins, jark. Mixers, 3,000 gal., size 30, type X.
- 1—100 qal. jack. B.P. Mixer, heated blades. 1—Patterson 110 qal. S.S. Vacuum Knead-
- master.
 1—Day #10 Cincinnatus, jock. 343 gal.
- 1—Baker Perkins, size 8, 5 quallon working capacity, jecketed Laboratory Vecuum Mixer with Cleveland Reduction Drive and 5 HP, AC motor.
- I-AMF 340 qt. Glen Mixer, 2 S-S Bowls and heaters, md-new 1949-practi-
- 3-AMF 180 and 120 qt. Glen Mixers, 20 5-8 90 and 160 qt. bowls and beaters, and, new 1949—practically new.
- 1-McClellan 38" dia. 400 lb. copper lined mixer.

JACKETED KETTLES

- 1-1000 gal. Stainless Steel, Jack. agit.
- 45—Aluminum & Stainless Steel 20 gal. to 150 gal.
- 1-500 gal. open agitated.
- 2—Lee 200 gal. S.S Kettles, 125#.
- 4-Burkhardt Copper, 275 gal.
- Copper 600 gal. turbine agitated copper coils.
- l—100 gal. and one 150 gal. Dopp small C. I. dbl. motion agitated..
- l—10' dia. x 4' Bartlett and Snow 1800 qallon, with agitator, 9/18" plate, 80 lbs.
- 1-5,000 gal. steel, closed agit.

MISCELLANEOUS

- 350—Stainless Steel Dryer Trays. 34" x 34" x 11½" deep.
- 1-Copper Rectifying Column, 8 sections, 30" dig x 33" high, bubble cap type.
- 15—Dry Powder Mixers and Blenders, rotary and horizontal ribbon type, 100 to 5000
- 1-Capem, S.I.F. Capper, cap feeder, m.d.
- 4-ALL STAINLESS STEEL No. 7, Day "BO-BALL" Sifters, 40" x 84".
- 4—Swenson-Walker, Jacketed, Crystallisers.
- 1-Unused 4'x 8' KENNEDY BALL MILL, iron lined.
- 1-6" x 15" Sturtevant Jaw Crusher to 14".

 1-30" x 15" Sturtevant Crushing Bolls, balanced type.
- balanced type.

 1—5-Roll Raymond High Side Pulverizer.
- 1—Stokes DD2 Retary Tablet Machine.
- 2—Paul O. Abbe 30 gallon Pebble Mills with gear reduction; V-belts and 1½ HP motors.
- 10—Trane 24" x 48" double coil heater units, copper, with eight exhausters, each with 5 HP motors.
- 1—Tolhurst 40" Suspended type Centritugal, Monel perforated basket, 20 HP 2-speed vertical motor, bottom discharge, with unloader.

Take advantage of all the hardto-get items listed on both these pages—ready for quick delivery —no delays.

5—9800 Gal. Horizontal Stainless Steel Storage Tanks #304 S/S lined, now equipped for mixing and also jacketed for steam or for cooling.

ONLY A PARTIAL LIST-SEND FOR COMPLETE LISTING.

The Oldest and Largest Dealer in Rebuilt Chemical Machinery
SOLIDATED PRODUCTS COMPANY

2015 PARK ROW BLDG. N.Y. 38 N.Y. BArclay 7-0600

Cable Address EQUIPMENT

FOR SALE

1 Illinois Water Treating System, 509 GPH flow rate, complete with Zeolite tenk, 1 Illinois Weter Treating System, 500 GPH flow rois, complete with Zeolite teak, controls, etc.

1 Hardings Cenical Ball Mill, Steel Liner, 4%" dia. x 34" long, 5 grout Waldron Attrition Mills, double diac—sizes if cack 30.

Williams Hammer Mill type AK; size A, stainless steel.

Mixty Steel Model "D" Comminuting Machine, Steinless Steel.

1 Swenson Retary Continuous Vacuum Filter; Procoat type, 8' dia. x 8' face, rubbar covered and load acid proof construction.

1 FEINC Rotary Vacuum Filter, string discharge, 4'6" dia. x 6' face, alu-

2 INDUSTRIAL FILTER & PUMF MFG. CO.

2 Pressure lead filters, type RB, size 18x48,
88 sq. ft. rubber lined tenk, bremse
budiles.
2 Sweetland Filters—#2 and #5.
10 Filter Pressee, Cast Iron:
1 Sperry 38", 34 ch., open dely.
1 Shriver 30", 33 res. pl., open dely.
1 Shriver 44", 40 ch., open dely.
2 Sperry 18", 15 rec., pl., open dely.
2 Sperry 18", 15 rec., pl., open dely.
2 Sperry 18", 16 continuous Grains
Pressee, 34" and 34" wide.
1 Pam Dryer or crystullizing Ketle, 10"
dia. x 3" deep.
1 Pam Dryer or crystullizing Ketle, 10"
dia. x 3" deep.
2 Stokes #38, Jacketed Vacuum Rotury
Dryer, 18" dia. x 42" long, with pump
and condensor.
2 Atm. Double Drum Dryers, 2"x38".
1 Cummos Rotary Indirect Hot Air Dryer,
4' dia. x 30" long.

STAINLESS STEEL TANKS IN STOCK

1—5700 gal. Horiz., T304—NEW 1—5700 gal. Horiz., T302—NEW

1-3500 gal. Vert., closed, T302/304

1—2350 gal. Vert., apen, T302—NEW 1—2000 gal. Horiz., Truck Tank 1-1400 gal. Vert., open, 10'L x 57"W x 57"D

4—1000 gal. Vort., T304—NEW 3— 500 gal. Vort., T304—NEW 50—Stainless Steel Tanks—from 6 gal. to 450 gal. sizes.

8—3000 gal. Herizontal Demountable Stainless Steel Truck Tanks, 5'4" dis. x 18"9" long, insulated and ogitated. Excellent for transport-ing, stroage or holding.

Porter heavy duty jacketed double worm mixer—75 qal.
 Read heavy duty double arm jacketed mixer, 200 qal. working cap., stainless

Stool.

1 Broughton Powder Mixer, double arm, 2400#.

10 Copper Comical Blenders, ½, 1, 7 & 11 cs. ft.

cu. ft.

Selectro Vibrating Screens, stainless
steel, 2' x 7', double deck, enclosed.

Kux Mach. Co. Model 25 Rotary Pellet
Fresses, 21 & 25 punch—with motor and vari-drive

8 Stokes Rotary Pellet Presses, 16 punch —B-2, D-3, D-4.

5 Aluminum Tanks, closed, vacuum or pressure: 500, 1100, 1350 & 1485 gal.

belted C.I. top. 3000 gal. Horis. Steel Cooker, Vacuum. Agitated.

Agitated.

Lead Lined Kettle, 500 gal., closed top, with coils, jacket & agitator.

Aluminum 100 gal. Reaction Kettle, Jktd. Aluminum 100 gal. Reaction Lettle, Jans.
 Agit.
 Glass Lined Kettle, Jktd. 6 Agit. 30 gal.

5—Vertical Jacketed Pressure Tanks— steel — 30:2 steam jacket — 6mm vacuum internally: 3-34" ID x 15" H (opprex. 700 gal.) 1-23" ID x 10' H (apprex. 230 gal.)

1-23" ID x .9' H (apprex. 195 gal.)

l Bird Suspended 48" steel centrifugal Perf. basket. 2 DeLaval #800 Oil Purifiers.

2 Copper Vacuum Kettles, 48" dia. sphere, jacketed, cuitated.

I Copper Vacuum Evaporating Pan. 6' dia.—Jacketed and coils.

1 Struthers Wells Evaporator, 100 sq. ft. 2 Spencer Turbine Co. Gas Boosters or Compressors, stainless steel, 30 HP motor, 600 CFM at 80 cs. pr.

Ingersoll Rand Type FS-538 Motor blowers 4000 CFM at 3 lb. pr.

Byron Jackson Deep Well Pump. 158 GPM 325' head, NEW.

Ingersoil Rand Bronse Centrifugal Pump #5ALV, 40 HP motor, 850 GPM at 140 —NEW.

Pumps, #11/2-RVH, 20 HP motor, 286 GPM at 230'.

Strinios Steel: 39 and 200 sq. ft. Aluminum: 168 sq. ft. Copper: 22, 75, 98, 330, 349, 429, 487 sq. ft.

5 Stainless Steel Coil Condensers, 48 sq.ft. 1 Stainless Steel T316 Still Pet, 4' dia. x 3' H., 100 sq. ft. tube bundle.

Copper Beer Still Columns, 24" dis. te 60" dis.

5 Copper Bubble Cap Calumns, 18" dia. to 78" dia.

3 Aluminum Bubble Cap Columns, 27" dia, x 18 plate & 38" dia, x 45 plate. 1 Aluminum Perforated Column, 28" dia. x 36 plate.

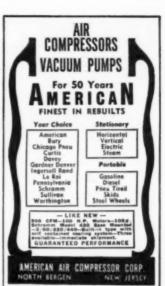
1 Steel and Cast Iron Bubble Cap Column. 30" dia. x 82 plate.

STAINLESS STEEL FABRICATION

We have in stock a quantity of Stainless Steel sheets: Type 304-12 ga., 14 go. and 16 go. Tanks, receivers, etc. fabricated to your specifications

Write: Attn. Fabricating Division.





FOR SALE

Filter Prosses: 24° C.I. pides and frame. Reactors: 230 gal, stainless steel. Dryer: affectableric double drum Bax80°. Kettles: 30 and 230 gal. et. thesi saftatasd. Kettles: 30 and 230 gal. et. thesi saftatasd. Kettles: 30 gal. et. pides defect. Autoclave: 10 and 230 gal. et. pides effect. Vacuum Fan: 5° Marris stainless steel. Kettle: 300 gal. coaper-closed steel. Kettle: 300 gal. coaper-closed steel. Powder Mixer: 100 to 2000 lb. capacities. Powder Mixer: 100 to 2000 lb. capacities. Powder Mixer: 100 to 2000 lb. capacities. Control Milits: Premier. Chariotte. Expendenth. Of Puriffer: 50 Losal No. 6000 gal. closed jack. Will: Hardings 5° 3 35° budges of the Milit: Hardings 5° 3 35° budges 5° 3 100 gal. closed jack. Will: Hardings 5° 3 35° budges 5° 3 100 gal. closed jack. We SULY—WE SELL—WE LIST WE BUY-WE SELL-WE LIST

LOEB EQUIPMENT SUPPLY CO. 127 W. North Ave. Chicago 22, III.

FILTER PRESSES—Sperry—Shriver—Johnson
—7"—12"—15"—24" and 30"

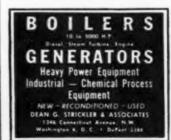
STAINLESS STEEL TANKS-500 Gallon to 1750 Gollon

STAINLESS STEEL KETTLES-40 Gallon to

U. S. AIR CONDITIONER—Type RK—Serial #9419-29 — 10 Hp. Motor — Complete with blower unit and motor—Self-con-tained—Practically New

AARON Equipment Company

1347 So. Ashland Ave., Chicago 8, Illinois PHONE: CHesapeake 3-5380



"BRILL BUY" is the Best Buy

A QUARTER CENTURY OF DISTINGUISHED SERVICE

DRYERS-KILNS

- -9'6"x8'6"x200' -- 34" shell

- -Link Belt 11'6"x35' Roto-
- Louvre Link Belt 2'7"x8' monel Roto-
- -Retary Dryers 7'x70', 7'x60', 5'x67', 4'6''x40', 4'6''x25', 4'x20'
- -Louisville Rotary Steam Tube Dryers 6'x50', 6'x30', 4'6''x
- -Buflevak Vacuum Drum Dry-ers 5'x12', 4'x8', 24''x20'' -Buflevak 20 and 15 shelf
- Voc. Dryers
- Vac. Dryers

 -Stokes & Buflovac Rotary

 Vacuum Dryers 30"x8",

 5'x20", 3'x15", 6'6"x38"

 -Blaw-Knox Stainless Steel
 Rotary Vac. Dryers 42"x8"

 -Brueckner Rotary Furnace
- 8'+11'
- Buflovac 32"x90" Atmos. Double Drum
- -Single Drum 60"x80" Flaker 14 Truck steam heated Dryer
- 1680 sq. ft. -P&S 45' long, 8' wide Convevor Dryer

CENTRIFUGALS

- 2-Tolhurst 49" Center Slung S.S.
- 2-AT6M 42" Suspended S.S. 6-AT6M 40" Bronze Boskets
- 1-Pletcher 49" Suspended, hottom discharge, S.S. perforated basket.
- 1—Toihurst 32" Suspended Monel. 1—Toihurst 32" Suspended 5.5.
- 1-A76M 20" Bubbar Covered
- 2-Bird 36"x50" solid bowl, stginless
- -Sharples P14 S.S. Super-D-Canter 4-Sharples #16 S.S. and steel

PULVERIZERS

- 2-Raymond 4 Roll High Side Mills
- 1-Raymond 3 Roll High Side Mill
- 1-Bauer 36" Attrition Mill 2-50 HP motor.
- 17—Patterson, Abbe Pebble & Ball Mills 80 to 1809 gais.
- 2-Premier Colloid Mills 8" dig., S.S. 1-Eppenbach QV7 Colloid Mill
- 2-Joffrey 36"x24", 20"x12" Hammor Mills
- 2-Raymond 8', 4' Air Separators
- 1-Ball & Jewell #11/2 Rotary Cutter
- 1-2 Roll Rubber Mill 6"x12"
- 1-S'x22' Tube Mill 2-Fitz Comminuting Mills 71/2 HP

SCREENS

- 5-Sprout Waldron Stainless Steel Single Deck. 40"x84"
- 1-Robinson Rotex Single Deck 40"x84", 40"
- 5-Tyler Hummer 4'x7' Single Deck
- 5-Tyler Hummer 3'x5' Triple Deck
- 1-Abbe #2 Blutergess Sifter

FILTERS

- 1-Vallez #49 Pressure Filter 41 leaves
- 2-Sweetland #12 with 36 and 72 lenves
- 2-Sweetland #7 and 27 steel
- 8-Oliver Rotary Vacuum 11'6"x14', 8'x12', 18'x10'. 8'x8', 3'x4', 3'x1'
- 3-Eimco Rotary Vac. 8'x8'. 4'x5', 4'x4'.
- 1-Oliver Rotary Vac. Precont 3'x4'
- 1-Feine Rotary Vacuum 8'x12'
- 2-42" P&F, 55 chambers, 2"
- 5-Shriver 30" P&F, 30 cham-
- 1-Shriver 24" Recessed, 30 chambers
- 3-Shriver 18" Rocessed, 30 chambers
- 2-Sperry Aluminum 24" & 30" P&F, 22 & 26 cham-Bors
- 1-Shriver Aluminum 12" P&F. 18 chambers
- 10-Shriver Wood P&F 18" to 42"
- 4-Shriver 36" P&F, 30 chambors
- 8-Sperry 24" P&F, 16 cham-
- 1-Sperry 36" Type 21 Recessed C.I. 48 chambers

FEATURED ITEMS

- -9'6"x200', 3/4" shell,
- Rotary Kiln -10'x160'. 9/16" shell.
- Rotary Kiln 7'x70', 1/2" shell, Rotary
- Dryer 6' dia. x 30' high S.S. Bub-
- Oliver monel 8'x10' Rotary Vac. Filters
- -Rogers Spray Dryer 16' dia.,
- with all accessories

 Steel 2000 gal. jucketed,
 agitated, 200 psi Reactors

 Bethlchem 1400 gal. steel,

- -Bethlehem 1400 gal. steel, jacketed Still
 -1000 gal. jacketed, agituted Steel Kettle
 -Dopp 230, 150 gal. jacketed, agitated kettles
 -Steel Storage Pressure and
 Acid Vessels 3500 to 20,-
- 000 gals.
 Buflovak VRC Tanks, stain-less steel Single Effect Evap-
- orator, 94 sq. ft.

 -Buflovak VRC, Triple Effect, 900 sq. ft.

 -Buflovak 6' dia. Vacuum
- Crystallizer
- -NEW Absorption Towers, 13,500 gal. cap. -Steel Tanks 9000 to 100,-
- 000 gals.

 Tubular Condensers 200 to
- 1000 sq. ft.

- MIXERS—ALL TYPES

 1—Baker Perkins 1800 qal. Jacketed 8.3.
 sigma blades
 1—Baker Perkins 300 qal. Unider 8.5.
 5—Baker Perkins 180, 20 and 9 qals., Jacketel
- eted -Saker Perkins 2 gal. Stainless -Day 100 gal. Cincinnatus jitti. double
- Day is we want to be a seen as a seen a seen

MISCELLANEOUS

- MISCELLANEOUS

 Bucket Exerters, see housings, 34' to 30' centers, 8''x5'' to 24''x6'' bucksts

 Slokes Vacuum Pumps 15 to 100 CFM.

 Millon Roy Proportioneer Pump, S.S. and Mastelloy, 10 GFM

 Oliver Horizontal Dry Vacuum Pump 400 CFM

 Devine, Buflovak Condensers and Receivers, 20 to 80 aq. 8.

 Colton Single Punch Tablet Markine 2514

PARTIAL LIST ONLY-STOCK CIRCULAR ON REQUEST WE BUY A SINGLE ITEM-OR A COMPLETE PLANT

EQUIPMENT COMPANY

2401 Third Ave., New York 51, N. Y. Tel: CYpress 2-5703

CHEMICAL EQUIPMENT

BELOW OPS PRICES

CENTRIFUGES

Tolhurst 49" perforated, bottom discharge. Fletcher 40", 33, bottom discharge, per-Bird 40"x60" Cent. solid bowl, rubber Bird 28"v50" Cont. solid howl, robbar cov. Bird 24" Cont. Type CH. Series 200.

BELT CONVEYORS (TROUGHING)

104' conters, 10" wide belt.
24' conters, 18" wide belt.
35' centers, 18" wide belt.
37' centers, 18" wide belt.
475' centers, 18" wide belt.
29' centers, 18" wide belt.
29' centers, 18" wide belt.
50' centers, 30" wide belt.
50' centers, 32" wide belt.

BUCKET ELEVATORS

70%" centers, 8" x 5" buckets.
64' conters, 10" x 6" buckets.
60' conters, 10" x 6" buckets.
50" centers, 8" x 5" buckets.
50" centers, 10" x 6" buckets.
44' centers, 10" x 6" buckets.
40' centers, 6" x 4" buckets.
23' centers, 6" x 5" buckets.

DRYFRS

Tunnel Truck 9'x35'x9', cap. 14 trucks. Turbulaire NZ Spray, with filter. Stokes, Rotary, Vacuum, 30"x8'. Vacuum Shelf Z11 Devine, 176 aq. ft. Builovak 5'x8' Atmos, single drum. Stokes, 4'x8' Atmos, double drum.

DUST COLLECTORS

4700 CFM, Buell, type AC-130 915AL (10), 4700 CFM, Buell, type AC-138 915AL, SE lined (7). 10.000 CFM, Birmingham, cyclone.

FEEDERS & SCREENS

Syntron, vibra-flow, type F350. Jeffrey-Taylor type 4/T ISS. Allis-Chalmers electro magnetic, "Utah." Fuller 8", star type (2 NEW). Tylor-Hummer 4' x 7' Vibrating Screen.

FILTERS

716.1833
36" open, 27 chambers, weed plates,
36" Sperry, Type 47, 28 chambers,
8"x12" Feinc, all steel,
8"x18" Oliver, wood 6 steel (3),
116"x18" Oliver, all steel,
27 Sweetland, 2" spacing, 28 leaves avail.

Four cage, Stedman.
5'x22' Smidth, Tube.
6'x8' Patterson, Pebble.
6'x8' Abbe Style CPH, Pebble.
16'x40' No. Pebble.
16'x40' Desp. 3-tell. lak.
Abbe Size S Grinding.
Kombinater, Flow Manter K Model 200.
L.B. Pug, 2' wide 12' long, double shaft (2).

MIXEDS

MIAERS
Paddle, 19"x24"x18", complete w/drive
Paddle, double shaft, 146 cu. ft. (NEW).
Readco 1½ 5A. 88 gals.
Blystone 48"x57", 506 gals. (2).
Blnks, type T9660, 100 gals. (2).
Champion, type E, size 2, 110 gals.
Alax. x3 Super, 173 gals.
Sublimator, hor., 4'x21".

KILNS-COOLERS-DRYERS

1106-35 Roto-Louvre.
7:x80"x25" with lifters.
6:x14x9'l48" Struthers-Wells (2—NEW).
5:x87"x5'18" with lifters.
4:x34"x5'18" Struthers-Wells.
4:x35"x5'18" brick-lined. 4 x16 x3/16 Srca-ined. 4 x16 x3/1 lowe with burner 25"x15'x3/4". 10'x90'x9/16" Allia Chalmers. 9'6"x0'6"x200'x3/4". lows with burner & stock.

PRESSURE VESSELS

TRESOURE YESSELS 11,000 cdl. 93" IDX 35" OA, 300 PSI test. 9,200 cdl. 6"x80"x2", 300 PSI. 9,500 cdl. 5"x23"x3", 300 PSI (4). 2,000 cdl. 5"x13"71;", 10E PSI. 1,250 cdl. 4"x14", 10E PSI. 1,250 cdl. 4"x14", 10E PSI. 1,200 cdl. 42"x16"8" x5/18", 125 PSI, ASME U 65. 1,050 gal. 4'x12'x12", 106 PSI.

STAINLESS STEEL TANKS

3,000 gal. 5'x21'8"x\4", Type 430. 2,300 gal. 5'x16'x\4", Type 304.

TANK CAR TANKS

6,500 gal. 78"x28"7" shell 11/16" 4 5/18" (25).

TOWERS

8'x36'x36' Absorption (2—UNUSED). 6'x44'x2\4'' Scrubber. 5" heads, 225 PSL. 6'x43'x34'' Bubble Cap. 19 bubble of trays. 6'x29'8", Bubble Cap. \$5, 21 trays.

MISCELLANEOUS

BLOWERS-From 1000 to 75,000 CFM. BUILDING-27'x56'x27' clearance, bolted. CONDENSER-Scraper-8'x15', aluminum. KETTLES-40 gal. SS. jack't'd, 40# (6). PUMPS-All sises & cap PIPE-HAVEG, KARBATE. TABLET PRESSES-Colton REDUCERS & VARI SPEED DRIVES.

PROPANE PLANT

Complete plant. Vaporizing and Mixing Equipment, including 18,000 gal-lon storage capacity in 3-6000 gal. tanks. ASME U69, 200 PSI WP.

ABOVE IS ONLY PARTIAL LISTING OF OUR INVENTORY ASK FOR BROCHURE



MACHINERY & EQUIPMENT MERCHANTS

ALWAYS YOUR OLD RELIABLE SOURCE

- 1-New Tolhurst 48" Stainless Steel Center Slung Centrifuge
- 1—Buflovak Vac. Shelf Dryer 12 Shelves 42" x 42"
- 1-Stokes Vac. Dryer 6 Shelves 24" w 36"
- 1-Nickel Plated Drum 48" x 46"
- 1-Stokes "R" Single Punch Press, MD
- 1-Stokes "DDS-2" Rotary Press, M.D. 2-Stokes "B-2" Rotary Presses. M.D.
- 1-Shriver 30" C.I. Filter Press 36 Ch.
- 1-Shriver 42" C.J. Filter Press 26 Ch.
- 10-Stainless Steel Agitated & Jacketed Kettles, 100, 125, 150, 950 gals.
- 10-Stainless Steel Tanks 200 to 1000
- 3-Aluminum Tanks 1500 Gals, Closed 3-Aluminum Bubble Cap Columns 27"
- and 36"
- 1-Day Cin. 100 Gal. Double Arm Jack, Mixer 3-Rotex Screens 40" x 84" to 40" x
- 120" 5-Fitzpatrick "D" Comminutors Stainless Steel M.D.
- 1-Mikro #2FF Pulverizer, S.S. & Brze. Const.
- 4-Steel Tanks 5000 to 10,000 Gallons

Bulletin A-29 Lists Over 400 More Desirable Items. Write for Copy.

We Buy Individual Items to Complete Plants.

THE MACHINERY & EQUIPMENT CORP.

533 West Broadway New York 12, N. Y. GRamercy 5-6680

For Sale

For Sale SPECIALIZING IN REBUILT MACHINERY

Irving Barcan Company 249 ORIENT AVE.

JERSEY CITY 5, N. J. Phone-Dilaware 2-6695-6

FOR SALE

LESTER KEHOE MACHINERY CORP. I East 42nd Street, New York 17, N. Y. Murray Hill 2-4616 IT'S NO LAUGHING MATTER

WHEN YOU WANT MACHINERY AND CAN'T GET IT

DON'T GET CAUGHT - USE

GELB

FOR QUICK DELIVERY & VALUE

- —Niegara Model #200 Filter, Stainless Steel Leaves. —Shriver 24" x 24" Stainless Steel Jacketed Filter Press, 10 Chambers, Closed Delivery, 4 Eye, Washing Type.
- ing Type.
 2—Shriver 36" x 36" Cast Iron Plate & Frame Filter
 Presses, 24 Chambers, Open Delivery, Washing Type.
 1—Shriver 42" x 42" Evodur Plate & Frame Filter Press,
- 40 Chambers, Closed Delivery.

 -Sperry Heresite Covered Filter Press, 36" x 36",
 4 Eye, Closed Delivery, 17 Chambers.





- 4 Eye, Closed Delivery, 17 Chambe

 1—Fuller Model C-200 Compressor.
 2—A. T. & M. Steinless Steel Suspended Type
 Centrifuge, 54" Imperferente Basket.
 1—A. T. & M. Steinless Steel Suspended Type
 Centrifuge, 54" Imperferente Basket.
 1—T. & M. Steinless Steel Suspended Type
 Centrifuge, 54" Imperferente Basket.
 1—T. & Sald Bow. 18" x 28" with motor.
 1—Farcher Understaing Centrifuge, 20" Steel Imperferented Basket.
 5—Sharples 21'6 Steinless Steel Centrifuges, Size
 6, Type 1-37.
 1—Tolhust Steinless Steel Centrifuges, Size
 6, Type 1-37.
 1—Tolhust Steinless Steel Centrifuges, Size
 6, Type 1-37.
 1—Tolhust Steinless Steel Centrifuges, Size
 6—Tolhust Denie Steel Steel Centrifuges, Size
 6—Tolhust Denie Steel Centrifuges, Size
 1—Buffered Double Drum Dryer, 24" x 36"
 1—Buffered Double Drum Dryer, 24" x 36"
 1—Buffered Double Drum Dryer, 31" x 30"
 1—Buffered Double Drum Dryer, 24" x 36"
 1—J. P. Derine Voscum Shell Dryer, 3 Sheives
 1—Louisville Retery Steem Tube Dryers, 6" x 25'
 1—Louisville Rotary Steem Tube Dryers, 6" x 25'
 1—Shriver 34" x 32" Cost Iron Filter Exchangers, 500 sq. ft. each, 5" Steem Tube Dryers, 6" steem Filter Press, 34
 1—Shriver 36" x 38" Cast Iron Filter Press, 38
 1—Shriver 36" x 38" Cast Iron Filter Press, 34
 1—Sperry 42" x 24" Aluminum Piate & Frame
 Filter Press, 18 Chambers, Closed Delivery,
 1—Sperry 32" x 30" Cast Iron Filter Press, 34
 1—Sperry 42" x 24" Aluminum Filter Press, 34
 1—Sperry 42" x 24" Cast Iron Filter Press, 34
 1—Sperry 42" x 24" Cast Iron Filter Press, 34
 1—Sperry 42" x 24" Cast Iron Filter Press, 34
 1—Sperry 42" x 24" Cast Iron Filter Press, 34
 1—Sperry 42" x 24" Cast Iron Fil

- 1—Stainless Steel Mixing Kettle, 1,000 gals. cap., with Nettco WT-37 Drive.
 3—Steel Vertical Pressure Tanks, 4' x 12', 1,000 gals. cap., 125 lbs. working
- pressure, ASME Code.

 -Steel Welded Vertical Storage Tanks, 9' x 18', 8,000 gais. cap.

 -Steel Vert. Storage Tank, 10,000 gais. cap., 125 lbs. working pressure,
- ASME Code. 13—Steel Welded Vertical Storage Tanks, 9' x 36', 16,000 gals. cap.

- Jacketed Kettie, 156 Geis. Cap.
 Artesian Metwl Works Steel Jacketed Kettle.
 1,000 Gels. Cap.
 1, P. Devine Steel Jacketed Vacuum Kettlet.
 2,000 Gels. Cap. Ea.
 2,000 Gels. Cap. Ea.
 2,000 Gels. Cap. Ea.
 2,000 Gels. Cap. Ea.
 8,100 Cels. Cap. Each.
 8,100 Gels. Cap. Each.
 Nickel Jacketed Vacuum Kettle, 400 Gels. Cap.
 Nickel Jacketed Vacuum Kettle, 400 Gels. Cap.
 Nickel Jacketed Vacuum Kettle, 400 Gels. Cap.
 Nickel Jacketed Kettle, 500 Gels. Cap.
 Nickel Jacketed Kettle, 10 Gels. Cap.
 Nickel Jacketed Kettle, 10 Gels. Cap.
 Capper Storage Tanks, 4,000 Gels. Cap. Each.
 Steel Storage Tanks, 6,000 Gels. Cap. Each.
 Steel Storage Tanks, 6,000 Gels. Cap. Each.
 Steel Storage Tanks, 2,100 Gels. Cap.
 Belsw Knox Steel Jacketed Autoclave, 6' x 13'
 Belsw Knox Steel Jacketed Autoclave, 6' x 13'
 Belsw Knox Steel Jacketed Autoclave, 6' x 13'
 Belsw Knox Steel Jacketed Steel Gels. Cap.
 Belsw Knox Steel Jacketed Belswere, 1 Gel. Cap.
 Belsw Knox Steel Jacketed Steel Gelswere, 1 Gel. Cap.
 Belsw Knox Steel Jacketed Steel Gelswere, 1 Gel. Cap.
 Belsw Knox Steel Jacketed Steel Gelswere, 1 Gel. Cap.
 Belsw Knox Steel Jacketed Steel Gelswere, 1 Gel. Cap.
 Belsw Knox Steel Jacketed Steel Gelswere, 1 Gel. Cap.
 Belsw Knox Steel Jacketed Steel Gelswere, 1 Gel. Cap.
 Belsw Knox Steel Jacketed Steel Gelswere, 1 Gel. Cap.
 Belsw Knox Steel Jacketed Steel Gelswere, 1 Gel. Ca

- 2—Baker Perkins Jacketed Missers, 200 Gels. Cap.
 Each with Sigme Blades.

 1—Cavagnarre-Loomis Stuinless Steal Jacketed
 Vaccum Misser, 100 Gels. Cap. with Fish-teil
 Blades.

 2—J. H. Day Megal Missers, 215 & 5 Gels. Cap.

 1—J. H. Day Megal Missers, 215 & 5 Gels. Cap.

 1—J. H. Day Megal Missers, 215 & 5 Gels. Cap.

 1—J. H. Day 223 Brighten Missers (Pony Type).

 175 Gels. Cap. Each.

 1—Spenbach Steinless Steel Home Misser with 1

 HF Explosion Proof Motor.

 2—J. H. Day 20—8 Prowder Misser, 2100 lbs. Each.

 1—Godge Gray Prowder Misser, 216 Gels. Cap.

 1—Read Steinless Steel Home Misser with 1

 HF Explosion Proof Motor.

 1—Read Stein Steel Powder Misser, 100 Gels. Cap.

 1—Fizperity Model D Comminuiting Machine.

 15 Steinless Steel & Bronze Construction.

 1—Mikro 22-1H Pubrarizer, Stainless Steel & Bronze Construction.

 2—Read Steinless Steel Atomizers, #5 & #6.

 1—Raymond 200 Automatic Palverizer.

 1—Stokes Model #8-2 Retury Tablet Machine.

 1—Stokes Model #8-2 Retury Tablet Machine.

 1—Nash Vaccuum Pump Model H-7.

CHEMICAL, RUBBER, OIL, PLASTIC and FOOD PROCESSING MACHINERY

STATE HIGHWAY No. 29,

UNION, N. J.

· UNionville 2-4900

Rebuilt For New Machine Accuracy At Tremendous Price Reductions International S. S. Straightline Vacuum Filler, 160 per minute. Resine S and LC Automatic Cappers. CRCO New Way MH Wraparound Labeler. S. & S. GI, G2 Auger Fillers. Stokes and Smith Model HG8B Duplex Auger Powder Filler. Colten 2 & 3RP Rotary Tablet Machines. Stokes 2C Cream Filler and Closer. Triangle Package Elec-Tri-Pak G2C, G25, A2C, NZCA and A6CA Fillers. Filler 4 Head S. S. Filler. Horix S. S. 14 head Rotary Filler. Standard Knapp No. 429 Carton Saler. Mikro 4TH, 3TH, 15H Pulverizers; Jay Bee UI, Schutz O'Neill Mills. Act Now For Choice Buys Tell Us All Your Machinery Requirements UNION STANDARD EQUIPMENT CO. 318-322 Lafayette Street New York 12, N. Y. CLASSIFIERS. CALASCHITERS. CALASCH

BUY BEST in the WEST

Krenz S.S. Vac. Pan. 6'x16' Coil Type. Raymond 5 Roll High Side Mill. Monel Pressure Tanks, 1200 gal. cap (2) Sharples Roto-Jectors S.S. M-NS-66. (3) Dorrco Vac Filter 8'x3' Monel Screen. Charlotte 30 H.P. Colloid Mill. Tyler Hummers 3x5 Triple Deck. (6) Vallex S.S. Rotary Leaf Filter, Model 49. #7 Sweetland, 41 leaves, 2" centers. Pfaudler 500 Gal. Agitated Reactors. (2) Oliver Precost Vocuum Filter, 3'x4'. Sparkler S.S. Filter Model 33-D-17, Rotex Gyratory Sifter, 60x120 Screen. 30x30 Filters-P&F. 35 chambers. (4) Williams Hammermill type HM size B. Abbe Tube Mill, 42"x10' Porc. Lined. Abbe Pebble Mill, 20"x27" S.S. Hoat Exchange. 8-1" Tubes 10" long. New Jersey Pany Labelers. (3) 11'x56' ASME Rubber Lined Tanks. (20)

We buy your surplus equipment MACHINERY AND EQUIPMENT CO. 516 Bryant St. San Francisco 7, Calif.

STEEL STORAGE TANKS

18-8000 & 10,000 Gel. R.R. Cor Tenks. -25,000 Gel. 34 Inch Herizontel. -10,000 & 15,000 Gel. 1/2 Inch Heriz. -2500, 5000 & 10,000 Bbl. Vert. L. M. STANHOPE Rosemont, Penna.

ECH SPECIALS

Mikro #4 With 40 HP Motor
Despatch 2 Compartment 4 Truck Truy Dryer,
Gas Fired, Complate
Barfello 40 x 42 Vacuum Shelf Dryer, 16 Shelf,
With Condenser
2 Day Robell #271 Sifters, 48" x 84", with 2
HP Motors, 5. 30 of Steel Screens
500 Gal. 5 Steel Reactor, 74rd, for 200# PresMotors
500 Gal. 5 Steel Reactor, 74rd, for 200# PresMotors
71 Pressars, Agrid, With 15 HP
Motors
71 Abbe Belgium Block Lined Mills, 5" x 4",
4½" s 5"
170 Gal. 304 S. S. Autoclave, good for 3300 PSi
J. H. Day Jitd. Vacuum Mixer, 5 Gal. Working,
S. S. Sigma Blodes & S. S. Bowl, Like New
Type 347 S. S. Tumbling Borrel, 5" x 5"
Shriver & Sperry Filter Presses, 6" to 42"
Day 15 Gal. Jitd. Mixer, 2 Cored Mosticater
5. S. Fitz Mill, Model D, 5 HP, Admoster
5. Fitz Mill, Model D, 5 HP, Admoster
5. Steel Evaporators, Jitd., ASME
WHAT HAVE YOU FOR SALE?

WHAT HAVE YOU FOR SALE? For Better Buys & Service Phone SOuth 8-4451—9264—8782 You Can BANK On

QUIPMENT LEARING HOUSE, INC 289-10th ST., BKLYN 15, N. Y

23,970 POUNDS POWDER FORM-TECH. GRADE 310 LBS. FIBRE DRUMS 5680 Lbs. Located at Seneca Falls, N. Y 18290 Lbs. Located at Ottawa, Ohio Will accept best offer for all or part BYLVANIA ELECTRIC PRODUCTS INC. CLASSIFIERS: 4-Akins 54" and one 36", Simplex, single acrew, Well type, with 440 volt, AC motors.

DRYERS or Kilns: 2—Allis Chalmers 10 ft. z 90 ft., heavy duty, plate thickness 9/16", complete and with or without coal fired Purnace, Western Precipitation Dest Colleter, Clarage #61 Exhauster, Motors, control equipment, etc. 1—4" z

PULVERIZERS: Hardingo Mill size 8 ft. z 22°, sized lined, complete with diss feeder and 30 H.P. montor. 1-16 ft. z 3°, Hardings Contast Ball Mill with 300 H.P. motor and all auxiliary equip-ment for dry grinding. 1-5° z 36° silica lined. 1-8 surrowant 1/8 Ring Roll Mill.

COAL CRUSHER: Jeffrey Fiextooth 34° x 42° with Allia Chalmers, type ARZ, 75 H.P. motor, 3 phase, 60 cycle, 2300 rolt, 24 hrs., 55 deg., 1470 RPM, with 5 groove V belt pulley.

COMPRESSOR: Worthington 2 stage, 29/18% z 21, type DC2, 609 H.F., symefronous motor, 2 phase, 60 cycle, 46 cycl., 180 RPM, cop. 2002 CDM, 104 108, pressure and compared to the compared to the Worthington new, available immediately. 1— Worthington 18—9% z 12, cas, 700 CPM @ 100 lise, direct connected to 469 volt, 125 H.F. spra-chronous motor, with all sutilists equipment.

DIESEL MOTOR: 122 H.P. Caterpillar D13000

BOOT BUCKET ELEVATORS: 3—43 ft. 64 man-gamene steel chain, buckets 16" wide. 1—70 ft. cc buckets 8 x 5 on 878 Reliance chain. NEW, UNUSETD.

THICKENERS: Acid Proof Thickeners, one 100 ft.,

AGITATORS: One 26 ft. and one 28 ft. 1-Dorr 26' x 22' type A.

FILTER: 1-Oliver 14 ft. dia., 16 ft. face.

MAGNETIC PULLEY: 24" with 1% KW MG set with or without 24 x 100" conveyor, 7% H.P. or without

> A. J. O'NEILL LANSDOWNE, PA.

PHILA. PHONES: Madison 3-8300-3-8301

10,



CHEMICAL AND METALLURGICAL PLANT

FOR SALE

GEORGE COHEN SONS & CO. LTD., are co-operating with A/S AARDAL VERK, a large undertaking controlled by the Norwegian Government, in the disposal of the magnificent Plant at the Alumina Factories at Aardal and Saudasjoen. Much of this plant, which is of first class Danish and German manufacture, is unused and has not even been erected. The rest is almost new. The total value amounts to several hundred thousand pounds.

Here are just a few outstanding items :-

 An exceptionally fine PLANT for PACKING DRY POWDERS in Paper Sacks, by F. L. Smidth, of Copenhagen.

Capacity 120 tons per hour. Complete with buildings, and all auxiliaries.

- 2 GAS PRODUCER PLANTS each with a capacity of 580,000 cu. ft. of gas per hour. (One Plant complete with steel building.)
- 13 Imperial CONCENTRATION FILTERS of the Vacuum Drum type.

• 15 Twin Unit KELLY FILTERS by Dorr-Oliver.

(Many of the above filters have monel metal filter fabric.)

- 55 AGITATORS for Dorr Thick-
- 25 sets of Duplex Beltdriven Dorrco SUCTION PUMPS.
- A large variety of Centrifugal SLUDGE PUMPS of varying Heads and Capacities.

- 4 unusually large Siemens-Lurg-Cottrell ELECTROSTATIC PRECIPITATION PLANTS.
- 4 Turbo GAS COMPRESSORS AND MIXERS by Escher Wyss of Zurich. Capacity 8/11,000 cu. ft. per min. to 50 lb. per sq. in. pressure.
- 8 MAGNETIC SEPARATORS.
- A large quantity of ELEVA-TORS, CONVEYORS, SHAKING SCREENS.
- Also new VALVES and FLANGES for large diameter PIPES, etc. etc.

The whole of the Plant is lying on sites easily accessible for loading. It will be carefully dismantled, marked for re-erection, packed as necessary, and loaded F.O.B. Convenient Norwegian Port. Catalogues will be sent on request. GEORGE



COHEN

SONS AND COMPANY LIMITED

Established 1834

WOOD LANE · LONDON, W.12 · ENGLAND

Cables: Omniplant, Telex, London

QUICK DELIVERY ON GUARANTEED EQUIPMENT

Large Stock at our Brooklyn Warehouse & Shop

DRYERS & KILNS
2—Prostor & Schwartz 6 fan automatic Conseper
proven, 2 feet 67 Chilling Unit.

Dryers, 2 feet 7 Chilling Unit.

Dryers, 2 feet 8 feet 8 feet 7 Chilling Unit.

Dryers, 2 feet 8 feet 8

I—Lyden Stenen Heahed Atimos. Tray Dryer; 199
6. ft.
6. ft

MIXERS-ALL TYPES
Baker-Perkins heavy duty double arm I

Baker-Perkins heavy duty double arm Mixers, and dis sale.

Horizon dis m Mixers, 200, 9

SCREENS & SIFTERS

-Tyler #38 Jr. Hummer Screens, 20" x 30".

-Gyratary suspended Bifters 20" & 24".

2—Typer 233 J. Augustus bereint, for a 2-c.

—Gyratery sespended bilters 20° & 2c.

4.—200 Ten Brunswick 10° controks Record Presses.

—French Oil Linssed & Cettensed Hydr. Presses.

—French Oil Moter Driven Expediers.

200 c w 15° 2 class motor di Cabrid. Pump.

4.—French Oil Moter Driven Expediers.

200 c w 15° 2 class with discontrol of the 2c.

200 c w 15° 2 class with discontrol of the 2c.

200 c w 15° 2 class with discontrol of the 2c.

200 c w 15° 2 class with discontrol of the 2c.

200 c w 15° 2 class with discontrol of the 2c.

200 c w 15° 2 class with discontrol of the 2c.

200 c w 15° 2 class with discontrol of the 2c.

200 c w 15° 2 class with discontrol of the 2c.

200 c w 15° 2 class with discontrol of the 2c.

200 c w 15° 2 class with discontrol of the 2c.

—Grant of the 2c.

200 c w 15° 2 class with discontrol of the 2c.

200 c w 15° 2 class with discontrol of the 2c.

200 c w 15° 2 class with discontrol of the 2c.

200 c w 15° 2 class with discontrol of the 2c.

200 c w 15° 2 class with discontrol of the 2c.

200 c w 15° 2 class with discontrol of the 2c.

200 c w 15° 2 class with discontrol of the 2c.

200 c w 15° 2 class with discontrol of the 2c.

200 c w 15° 2 class with discontrol of the 2c.

200 c w 15° 2 class with discontrol of the 2c.

200 c w 15° 2 class with discontrol of the 2c.

200 c w 15° 2 class with discontrol of the 2c.

200 c w 15° 2 class with discontrol of the 2c.

200 c w 15° 2 class with discontrol of the 2c.

200 c w 15° 2 class with discontrol of the 2c.

200 c w 15° 2 class with discontrol of the 2c.

200 c w 15° 2 class with discontrol of the 2c.

200 c w 15° 2 class with discontrol of the 2c.

200 c w 15° 2 class with discontrol of the 2c.

200 c w 15° 2 class with discontrol of the 2c.

200 c w 15° 2 class with discontrol of the 2c.

200 c w 15° 2 class with discontrol of the 2c.

200 c w 15° 2 class with discontrol of the 2c.

200 c w 15° 2 class with discontrol of the 2c.

200 c w 15° 2 class with discontrol of the 2c.

200 c w 15° 2 class with discontrol of the 2

WE BUY YOUR SURPLUS MACHINERY & COMPLETE PLANTS PARTIAL LISTING. WRITE FOR BULLETINS. PHONE: WORTH 2-5745

STEIN EQUIPMENT COMPANY

90 West Street, New York 6, N. Y.

Cable: Machequip

Mills, Pebble-10x20, 10x10, 5 pkt. lab. w/expl. prf. motors.

Mills, Hardinge-5'x22", 7'x45", 8'x32" w/motor drives.

Wills, Raymond 21, w/separator/cyclone. Sturt. 21 Ring Roll. Wms. LG-1. Quak. City #21,

Filter Presses, 24" center food, 72Lf, 20" w/25 p&f wash-open, 26" Read. pl. 62 Lf. 42" w/26 p&f, closed, nen-wash. Filters-Laughlin, Bird 4'x2', Sweetland

25, 211, Vacuum Pumpe-Nash Hytor H5-Devine

10"=10" Crushers Jaw-6x9, 8x14, 14x26, 24x26.

Crushers Roll-10x16, 30x16, 48x18, Skids, 1000 wood top, steel Reinf, legs 42x54x11 high.

New Pumps-Compressors-Exhausters

LAWLER COMPANY **Durham Avenue**

Metuchen, N. J. Metuchen 6-0245

FOR SALE

1-Filter, Dorco Drum type 12' diameter 10' long, drives, pumps, blower complete, good condition,

1-Hammermill #4033 Cedar Rapids diesel power, portable, new condition.

BASIC REFRACTORIES, INC. Maple Grave, Ohio

FOR SALE

ompresser, Stillivan Perin Angle Compound, com-plete with Air Baccieve, After Conler, Valves, eds., G.E. G. Spenchromous Midde, 42 and A. Carlotte, C. S. Spenchromous Midde, 42 and A. Actual 2566 CFM. empresser, 1-R Gs. 608 CFM empresser, 1-R Gs. 608 CFM empresser, 1-R Gs. 608 CFM

Compensee, i. B. Ca. 568 CF BI
Transfermer, OISC I phase of cycles 10 KVA to
2008 KVA.
Wound Rotor Motors as follows:
Wound Rotor Motors as follows:
100 RPM
1

Tube Wills, Silica Beick Lined 60° x 32° and 60° X 122° Will, Silica Beick Lined 60° x 32° and 60° X 22° Will, Silica Wessels, 2008 and 1742 Peil Presses, Logenson Hydraulle Blocking, \$25 CGX and \$25 CHX Catlod Mills with 2 HP Motor Retary Knife Cutters, Spront-Waldrens to \$2.4 Pill; Abbe 427, Ball & Donal \$25c.

PARKHURST & SEITZ th Ave. Oekland 6, Culif. 1026 6th Ave.

FOR SALE TWO WILLIAMS "4 Roller Mills".

High Side, Spinner Separators, Motors, complete. Used four meaths, By original owners. Immediate delivery.

FS-3233, Chemical Engineering 230 W. 42 St., New York 36, N. Y.

MOTORS, GENERATORS, TRANSFORMERS TRANSFORMERS 1 — 1500 H.P. Bought and Sold New and Robullt ELECTRIC EQUIPMENT CO CHESTER ! N. I

AIR COMPRESSORS

2-245 CFM Chicago Pneu., Type NBW. Synch motor driven comps. single stage 10 x 10, 277 RPM, 100 lb. pre. Comp. with all acces.

4—Nash Hytor Vacuum Compressors #2, motor driven, 860 RPM, 248 CFM at 10".

PHILADELPHIA TRANSFORMER CO. 2829 Cedar Street Phila., Penna.

FOR SALE: New Equipment

2—Bronzo Cent. Pumps, 6"n5", 1000 GPM—288"
hd. Allis-Chaimers.
22—100 GPM—288"
hd. Allis-Chaimers.
23—100 GPM—288"
hd. Allis-Chaimers.
24—25 GPM—38 PM—38 PM

VALVE AND SUPPLY CO. 378 Bedford Ave., Brooklyn 11, N. Y.

WILL BUY

Cancelled - Unshipped - Rejected or Over-Stocked

CHEMICALS-DRUGS SOLVENTS PHARMACEUTICALS OILS—PIGMENTS, ETC.

Chemical Service Corporation 80-04 Beaver St. New York S. N. Y.

Wanted To Purchase

Chemical firm interested in any or all of following used equipment: 2-Daubia Shaft Paddie Mixer 4 R. z 14 R.

2-Deputed binary Twiston Millary o Mt. X 10 ft. 2-Motary Kiins, direct drying 6 ft. X 46 ft. 2-Mopanoer Turbinse 2300 C.F.M. @ 24 sz. or imper. 1-Not Fan, 6000 C.F.M., 600° F., 18° W.C. or

larger.
2-dmail Roti Crushers, 2 TPH, ¼4" material.
1-Thickner, 20 or 30 ft, x 8" with tank.
2-Rotary or Star Feeders 2 TPH.
1-Vibrating Sereen, 2 deek, 2 TPH or larger.
Send complete information to:

W-3192, Chemical Engineering 330 W. 42 St., New York 36, N. Y.

WANTED

To Expedite Production

Process Mathinery including Vacuum Dryers, Heavy Duty Mixers, Reaction Rettlee, Columns, Botary Filters, Filter Presses, Pulverisers, Fackaging and Wrapping equipment, 5/8 and non-cor-resive Storage Tankage.

Will consider set up plant now operating or shut down. When offering give full particulars.

P. O. Box 1351 Church Street Sta., New York 8, N. Y.



AMERICA'S TREMENDOUS INDUSTRIAL PRODUCTION STARTS AT QUIET DESKS LIKE THIS!

. these are the functions comprising the REAL POWER PLANT behind red products, streaming from America's conveyor bolts . . and one of s is the proper selection of the equipment to DO THE JOB!

LIQUIDATING-

STILL ON LOCATION!

MULTIPLE EFFECT EVAPORATORS

Long Tube Double Effect Copper Evaporolor: 2000 sq. ft. per effect, with condensing equipment complete. 2000 sq. ft. per effect, with condensing equipment complete. 2000 sq. ft. per effect, with condensing equipment complete. Copper Quadruple Effect Calandria Evaporolor: 2005 sq. ft. per effect, with condensing equipment complete.

per cast, with conceasing equipment complete. Sewmone Wedded Steel Long Vule Expectate containing of 3 odies; one to five effects may be used; heating serfaces from 3000 sq. ft. as 502 sq. ft. asch; complete with all operating accessories. 2 Gaplin Diremichals Steel heatings accessories. 2 Gaplin Diremichals Steel heatings of 58,208 sq. ft. consolve with all operating occasions. (Prints and additional details on respect.)

2 C.H. Wheeler Herizantial Surface Condensary: non-with

C.H. Whoeler Heriusental Surface Condensors; one with ast Iron Shell 56"s17"2" with oppor tubes; approximately 00 op. 11, of healt transfer ourface; the other has Canti from tell, 42"x14"9" with Muntz Mutal tubes; approximately 100 op. 11, healing ourface; the

ACID TILE LINED AUTOCLAVES Acid tile lined steel autoclaves 6'10" x14" in the straight with oon tops and bottoms; 15" thick riveled steel shell designed for 100 PS1; approximately 3373 gais.

SUFFALO VACUUM DRUM DRYERS
3 Buffalo Vas. Drum Dryers with bronze drume 5'x12', with
copper centact parts, gamps, doctor knives, screw conveyer
3 H.P. meter, etc. BUFFALO VACUUM DRUM DRYERS

3 J.P. Devine Dryers same as above but 8'x18'8" with 25 H.P. Motors and complete accessories. Turn YOUR Surplus Equipment into CASH-

DRYERS

Squier Stainless Rotary Dryer, atmospheric, 30" x 20'.

Squier Stainless Rotary Dryer, atmospheric, 30" x 20".
Proctor 5 Schwarts Continuous Apren Dryer, 44' long.
Buflovac 20 Shell Dryer, 40" x 44", complete with condenser, receiver, pump, motor and connections.

"Largest Stock in New York"

HAMMERMILLS

6 Mikro Fulverlars up to No. 4.
6 Williams Hammer Mills up to 18" x 48"
grinding chamber.
Robinson No. 4 Mill with 60 HP.
Roymond No. "00" culumentic American
Jay Bee Type "A" Hammer Mill.
Aux Engl.

MIXERS Dry Powder Mixers, new or rebuilts, from 200 lbs. to 3,000 lbs. Baker Peckins Type Heavy Duty Double Arm Rtd. Mixers: all sixes. Lonacasier Model EAG4 Muller type Mixer, complete with hood, Loader, etc.

SPECIALS

Rubber and Textile 3 Boil Calendars: 14" x 42" and 18" x 54". Boil Calendars: 14" x 54miness. Aluminum or Copper Juckeled Varuum Pans or Sálls. Tablet Fresses by Stokes or Colton Stuls-less Tanks & Kettles in STOCK. Belts 18 Stokless Distintegrator.

STORAGE TANKS

-Prompt Shipment-GLASS LINED TANKS - USED - 1000 gallon capacity. Welded construction— Fully insulated. Equipped with man-Suitable for milk, food products, itly white chemicals, solvents and fine

TWO COMPARTMENT TANKS-USED-

VARNISH TANKS—USED—\$4° diameter x 14'8° high (or long) % Steel — Welded construction—1700 gallons.

MISCELLANEOUS TANKS-Various sizes

Hinged covers. 50" x 10' x 33" deep-3/16" Steel. 750 gallons. Suitable forcooking-mixing or storage.

Send for Our Complete Bulletin

The above comprises only paartial listing. Sand for our latest Inventory Butletin.

Your FIRST Source"

PEBBLE MILLS

ornational Percelain Lined Pebble Mills, 8' x 8', about 1,800 gal, working capac-ity; complete with 50 H.P., geared motors.

FILTERS Bird Young Botary Vac. Filters, 4' x 2' and

Brd Young moury van.
4' x 4'.
Oliver Continuous Rotary Vocuum Filter:
nickelled, 6' x 3''.
Oliver Sweetland Pressure Leaf Filters
from No. 1 to 12.

#EACTORS
Cont. Clause Lined Model XL.

Plaudler 1,000 gal. Glass-Lined Medel XL

Reactor. 3,500 cal. Itid. & Agitated Reactors, 2002; ASME. 6' x 16'6". 250 cal. 5.5. Skill, 42" x 42", with stainless reflux column. 500 cal. S.S. Jacketed Reactor.

CENTRIFUGALS

2 Bird rubber-covered Centringols.

Telhurst 40° Sell belancing Centr. with 7½ HP 2 speed motor; copper basket.

A. T. 6 M. Strinless Steel 80° Suspended Centrifugals with vacuum covers.

Shorples and DeLaval Centrifugals.

EQUIPMENT RENTED-TOO!

For Pilot Plants, ex-perimental Runs, and limited production, consider the FMC Rental - Purchase

157 HUDSON ST

and types.

NEW AND GOOD-AS-NEW EQUIPMENT

Stalminas Sinel Tanks, now. 100 and 200 qsi.
2—300 qsi. 2:16 Stalminas Tanks—new.
1—08talminas Tanks. No. 400 Chrome, verl. 7' dia...
10 desp., dishes Tanks. No. 400 Chrome, verl. 7' dia...
10 desp., dishes Tanks. No. 400 Chrome.
10 desp., dishes Tanks.
10 desp., dishes Stalminas Stalm

Inless 60set Tanks, new. (60 and 200 gal.

-300 gal. 2316 Stainless Tanks—new.
-300 gal. 2316 Stainless Stai

-1--Vibrux Barrel Vibrator. 1---150 gal. Steam Jackstod Closed Kettle, 150# w.p. on Jackst. 200# Inside, A.S.W.E. 6---3000 gal. Steam Jackstod Kettles with Turbo Apitators.

. 4643 LANCASTE. PHILADELPHIA 31, PA. & SON 4643 LANCASTER AVE. LOEB

BOTARY DRYERS

70° x 25° Rusgies Coles A-10. agie Shell: 4x20, 4x45, 5x30, 6x25, 8%x7x60.

Single Shell: \$x30, \$a45, 5a50, 6x45, 54g47w60.

***MISCELLANGOUS EQUIPMENT**
Hanns-range Leftery 50 x 35 D 4 4 3 x 35 FlexicothDines 60 - 3 Sholl Type 1.8.

7, 10 4 10 Machanical Air Separators

80 48 1 Raymond Automatic Pulveviare

4x4, \$x30, \$x4, \$x10 d 8 x30 lotary Kilns

8-5 x 20 Shirt Mose Tube Wills

8-6 x 20 Shirt Mose Tube Wills

8-7 x 10 Shirt Mose Tube Wills

8-8 x 10 Shirt Mose Tube Wills

8-9 x 10 Shirt Mose Tube Wills

8-9 x 10 Shirt Mose Tube Wills

Manazhee Sulphate Bocovery System

Hervisia Audom 2 Ros Pulvers

tirell Precipitator strell Precipitator strules Junior 3 Roll Palveriser de-Kuntz Continuous Hydrator Elec. Air Compressors, 1309, 3106 5—809 & 10,000 Gal. Tank Cars Ten Plymouth Diesel Locomotius for Chap Pacu. Elec. Compres 10 & 2174 Ft.

STANHOPE, 60 E. 42nd St., N. Y. 17, N. Y.

FOR SALE

(-42" x 10" Allo-Chalmen crushing relia.

(-30" x 10" Stortenan crushing relia.

(-30" x 10" Stortenan crushing relia.

(-4" x 10", 3" deck, 100 min "Gyrar" surrant.

(5" x 10", 7", 3" deck, 100 min "Gyrar" surrant.

(5" x 10", 7", 3" deck, 100 min "Gyrar" surrant.

(5" x 10", 7", 3" deck, 10", 3" x 10",

NEW-USED RECONDITIONED

Stram, Gas and Electric Power Equipment

PARKER THOMPSON CO., INC. SOT FIFTH AVE., NEW YORK CITY MURRAY HILL 7-6547-8-9

DOWTHERM VAPORIZER

1,000,000 B.T.U. FOR SALE

FOR SALE
#23-3A McKee Gas Fired, receiving timb,
condensers, coolers, Nikroloy Fump, interconnecting piping, valves and fittings.
THE O'RRIEN MACHINERY CO.
1515. Ph. Delawate Ave.
Philis. 25, Pa.

ERMAN-HOWELL DIVISION LURIA STEEL & TRADING CORP.

332 South Michigan Ave. Chicago 4, III. Telephone: Wabash 2-0250

TRADE WITH BAUER

BUY - SELL - TRADE

COMPRESSOR THE POST L.W.BAUER

CHEMICAL ENGINEERING-February 1952



There's a

Custom-Built AMERICAN CRUSHER

From small laboratory mills to high tonnage mills, American Crushers — with built-to-the-job efficiency — are femous for long-time service at lowest possible cost.





PULVERIZER COMPANY

Originators and Manufacturers of Ring Crushers and Pulverizers

1219 Macklind Ave. St. Louis 10, Mo.

"AC" Ring Mill with patented Shreader Rings-to 500 TPH





PROFESSIONAL SERVICES 463

SEARCHLIGHT SECTION

(Classified Advertising)

H. E. Hilty, Manager

EMPLOYMENT	
Positions Vacant	468
Selling Opportunities Offered 466,	467
Positions Wanted	
Employment Services	
SPECIAL SERVICES	
Contract Work	468
BUSINESS OPPORTUNITIES	
Offered	468
PROPERTY	
For Sale	468
EQUIPMENT	
(Used or Surplus New)	
For Sale468-	477
WANTED	
Equipment468,	476
Miscellaneous468,	476

ADVERTISERS INDEX

	470
	470
	472
	476
	477
Brill Equipment Co	471
Chemical Service Corp	476
Cohen Sons & Co., Ltd., Geo	475
Consolidated Products Co., Inc 468.	469
Dow Chemical Co	468
Drake Personnel, Inc	468
	476
Equipment Clearing House, Inc	474
	467
	477
	468
	473
	472
	477
	472
	476
	470
	477
Luria Steel & Trading Corp., Erman-	25.5
Luria Steel & Trading Corp., Erman- Howell Div.	477
Howell Div.	477
Howell Div. Machinery & Equipment Co. (Calif)	
Machinery & Equipment Co. (Calif) Machinery & Equipment Corp (NYC)	474
Howell Div. Machinery & Equipment Co. (Calif) Machinery & Equipment Corp (NYC) National Powder Co.	474 472
Howell Div. Machinery & Equipment Co. (Calif) Machinery & Equipment Corp (NYC) National Powder Co O'Brien Machinery Co., The	474 472 466
Howell Div. Machinery & Equipment Co. (Calif) Machinery & Equipment Corp (NYC) National Powder Co. O'Brien Machinery Co., The. O'Neill. A. J.	474 472 466 477
Howell Div. Machinery & Equipment Co. (Calif) Machinery & Equipment Corp (NYC) National Powder Co O'Brien Machinery Co., The O'Neill. A. J.	474 472 466 477 474
Howell Div. Machinery & Equipment Co. (Calif) Machinery & Equipment Corp (NYC) National Powder Co O'Brien Machinery Co., The O'Neill. A. J. Opell Metal Associates Parkhurst & Seitz Machinery & Equipment	474 472 466 477 474
Howell Div. Machinery & Equipment Co. (Calif) Machinery & Equipment Corp (NYC) National Powder Co O'Brien Machinery Co., The O'Neill. A. J Opell Metal Associates Parkhurst & Soitz Machinery & Equipment Perry Equipment Corp	474 472 466 477 474 468
Howell Div. Machinery & Equipment Co. (Calif) Machinery & Equipment Corp (NYC). National Powder Co. O'Brien Machinery Co., The. O'Neill. A. J. Opell Metal Associates Parkhurst & Soitz Machinery & Equipment Perry Equipment Corp	474 472 466 477 474 468 476
Howell Div. Machinery & Equipment Co. (Calif). Machinery & Equipment Corp (NYC) National Powder Co. O'Brien Machinery Co., The. O'Neill. A. J. Opell Metal Associates. Parkhurst & Soitz Machinery & Equipment Perry Equipment Corp. Philadelphia Transformer Co. Stanbope, L. M.	474 472 466 477 474 468 476 470
Howell Div. Machinery & Equipment Co. (Calif) Machinery & Equipment Corp (NYC) National Powder Co. O'Brien Machinery Co., The. O'Neill. A. J. Opell Metal Associates. Parkhurst & Seitz Machinery & Equipment Perry Equipment Corp. Philadelphia Transformer Co. Stanhope, L. M. Stanhope, Inc., R. C.	474 472 466 477 474 468 476 476
Howell Div. Machinery & Equipment Co. (Calif). Machinery & Equipment Corp (NYC) National Powder Co. O'Brien Machinery Co., The. O'Neill. A. J. Opell Metal Associates Parkhurst & Seitz Machinery & Equipment Perry Equipment Corp. Philadelphia Transformer Co. Stanhope, L. M. Stanhope, Inc., R. C. Stein Equipment Co.	474 472 466 477 474 468 476 476 476 477
Howell Div. Machinery & Equipment Co. (Calif) Machinery & Equipment Corp (NYC). National Powder Co. O'Brien Machinery Co., The. O'Neill. A. J. Opell Metal Associates. Parkhurst & Soitz Machinery & Equipment Perry Equipment Corp Philadelphia Transformer Co. Stanhope, L. M. Stanhope, Isc., R. C. Stein Equipment Co. Strickler & Assoc., Dean G.	474 472 466 477 474 468 476 470 476
Howell Div. Machinery & Equipment Co. (Calif) Machinery & Equipment Corp (NYC). National Powder Co. O'Brien Machinery Co., The. O'Neill. A. J. Opell Metal Associates. Parkhurst & Soitz Machinery & Equipment Perry Equipment Corp. Philadelphia Transformer Co. Stanhope, L. M. Stanhope, Inc., R. C. Stein Equipment Co. Strickler & Assoc., Dean G. Stylvania Electric Products Inc.	474 472 466 477 474 468 476 476 476 476 477
Howell Div. Machinery & Equipment Co. (Calif) Machinery & Equipment Corp (NYC) National Powder Co O'Brien Machinery Co., The O'Neill. A. J Opell Metal Associates Parkhurst & Seitz Machinery & Equipment Perry Equipment Corp Philadelphia Transformer Co. Stanhope, L. M. Stanhope, L. M. Stanhope, I.S., R. C. Stein Eqiupment Co. Strickler & Assoc Dean G Sylvania Electric Products Inc. Thompson Co., Inc., J. Parker.	474 472 466 477 474 468 476 476 476 476 477 176 176
Howell Div. Machinery & Equipment Co. (Calif) Machinery & Equipment Corp (NYC) National Powder Co O'Brien Machinery Co., The O'Neill. A. J Opell Metal Associates Parkhurst & Seitz Machinery & Equipment Perry Equipment Corp Philadelphia Transformer Co. Stanhope, L. M. Stanhope, L. M. Stanhope, I.S., R. C. Stein Eqiupment Co. Strickler & Assoc Dean G Sylvania Electric Products Inc. Thompson Co., Inc., J. Parker.	474 472 466 477 474 468 476 476 476 477 476 477 477 477 477
Howell Div. Machinery & Equipment Co. (Calif) Machinery & Equipment Corp (NYC). National Powder Co. O'Brien Machinery Co., The. O'Neill. A. J. Opell Metal Associates Parkhurst & Soitz Machinery & Equipment Perry Equipment Corp. Philadelphia Transformer Co. Stanhope, L. M. Stanhope, L. M. Stanhope, Inc., R. C. Stein Equipment Co. Strickler & Assoc., Dean G. Stylvania Electric Products Inc. Thompson Co., Inc., J. Parker. Truland Chemical & Engineering Co.	474 472 466 477 474 468 476 476 476 476 477 176 176
Howell Div. Machinery & Equipment Co. (Calif) Machinery & Equipment Corp (NYC). National Powder Co. O'Brien Machinery Co., The. O'Neill. A. J. Opell Metal Associates. Parkhurst & Soite Machinery & Equipment Perry Equipment Corp Philadelphia Transformer Co. Stanhope, L. M. Stanhope, I. M. Stanhope, I. M. Strickler & Assoc. Dean G. Sylvania Electric Products Inc. Thompson Co., Inc., J. Parker. Truland Chemical & Engineering Co. Union Carbide & Carbon Corp. Union Carbide & Carbon Corp. Union Standard Equipment Co.	474 472 466 477 474 468 476 476 476 477 176 170 874 477 468 468
Howell Div. Machinery & Equipment Co. (Calif). Machinery & Equipment Corp (NYC). National Powder Co. O'Brien Machinery Co., The. O'Neill. A. J. Opell Metal Associates. Parkhurst & Seitz Machinery & Equipment Perry Equipment Corp. Philadelphia Transformer Co. Stranbope, L. M. Stanhope, Inc., R. C. Stein Equipment Co. Strickler & Assoc., Dean G. Sylvania Electric Products Inc. Thompson Co., Inc., J. Parker. Truland Chemical & Engineering Co. Union Carbide & Carbon Corp. Union Standard Equipment Co. Williams, Inc., Roger.	474 472 466 477 474 468 476 476 476 477 476 477 476 477 468 467
Howell Div. Machinery & Equipment Co. (Calif). Machinery & Equipment Corp (NYC). National Powder Co. O'Brien Machinery Co., The. O'Neill. A. J. Opell Metal Associates. Parkhurat & Soitz Machinery & Equipment Perry Equipment Corp. Philadelphia Transformer Co. Stanhope, L. M. Stanhope, Inc., R. C. Stein Equipment Co. Stein Equipment Co. Strickler & Assoc., Dean G. Stylvania Electric Products Inc. Thompson Co., Inc., J. Parker. Truland Chemical & Rogineering Co. Union Carbide & Carbon Corp. Union Standard Equipment Co. Williams, Esc., Roger.	474 472 466 477 474 468 476 476 476 477 476 477 476 477 468 468



MICRO METALLIC

HEADQUARTERS

FOR YOUR

FILTRATION

PROBLEMS

*This lists only a few applications

MICRO METALLIC CORPORATION

31 Sea Cliff Avenue, Glen Cove, N. Y.





HERE'S A

Parade

YOU WON'T WANT

TO MISS ...

Everybody loves a parade but here's one that's particularly interesting to YOU because it's packed with "pocket-book" appeal. It's a never-ending parade of products and services designed to help you do your job better, quicker and cheaper. You're in the "reviewing stand" for this parade because it comes to you in the advertising pages of every issue of this magazine. Alert manufacturers use the advertising pages to get the news about their products and services to you .. quickly and effectively. To be well-informed about the latest developments in your industry...
and to stay well-informed..., read all the ads too.

McGRAW-HILL PUBLICATIONS



For more information about products of these advertisers, use Reader Service postcard in section following

Air Products Albert Pipe Supply Co. 1354 Allinetal Screw Pites Co. 13458 Allinetal Screw Pites Co. 1365 Allinetal Screw Pites Co. 1367 American Blaumers Mg. 273 American Bluwer Corp. 90 American Blower Corp. 90 American Pites Co. 1354 American Pites Co. 125 American Metal Hose Co. 215 American Metal Rubber Co. 212 American Pulverizer Co. 17478 American Pulverizer Co. 1746 American Pites Machine Co. 1466 American Pites Co. 260 Armstrong Machine Works Armstrong Cork Co. 255 Blaid Associates Inc. 254 Baker & Co. 10, 128-129 Ariold Dipyer Co. 118-119 Bailey Meter Co. 255 Blaid Associates Inc. 254 Baker & Co. 10, 139 Bairet Mg. Co. 118-119 Bailey Meter Co. 1352 Blaid Machine Co. 118-119 Bailey Meter Co. 158-119 Bairet Mg. Co. 100 Barnstead Still & Sterilizer Black Bly Corp. 442 Baker Bros. Co. 1732 Belgian Electric Sales Corp. 80 Bernis Bros. Bag Co. 296 Bersworth Chemical Co. 396 Bernis Bros. Bag Co. 296 Bersworth Chemical Co. 396 Berlieben Steel Co. 375 Black Blyalls & Brysse. Inc. 256 Black Blyalls & Brysse. Brown & Root Inc. 255 Black Blyalls & Brysse. Brown & Root Inc. 251 Black Blyalls & Brysse. Brown & Root Inc. 251 Black Blyalls & Brysse. Brown & Root Inc. 251 Black Blyalls & Brysse. Brown & Root Inc. 251 Black Blyalls & Brysse. Campor Products Inc. 264 Brown & Root Inc. 264 Brown & Root Inc. 265 Black Blyalls & Brysse. Campor Products Inc. 265 Black Blyalls & Brysse. Brown & Root Inc. 265 Black Blya	For more information a
American Bilumuin & Asphalt Co	Air Products 1.7457 Albert Pipe Supply Co B354 Aldrich Fump Co., The 388 Allmetal Screw Pdts. Co. B358 Alia Chalmers Tractor Div. 85 Alia Chalmers Mig. 35, 62, 261 The Louis Alias Co 308 Aluminum Co. of 52, 282, 307
American Pulverizer Co. L7472 American Tool & Machine Co. L456 American Wheelabrator & Equip. Corp. 221 Ampco Metal Ina. 44-48 Ansul Chemical Co. 284, 7358 Armstrong Orek Co. 364 Armstrong Machine William Co. 364 Armstrong Machine Wilson Co. 365 Armstrong Machine Wilson Co. 365 Armstrong Machine Wilson Co. 367 Arrow-Hart & Heseman Elec. Co. 362 Atlas Powder Co. 285 Babcock & Wilcox Co. 118-118 Balley Meter Co. 362 Atlas Powder Co. 365 Babcock & Wilcox Co. 118-118 Balley Meter Co. 368 Balley Meter Co. 368 Balley Meter Co. 329 Barrett Div. Allied Chemical Co. 388 Barrett Div. Allied Chemical & Dye Corp. 443 Bauer Bros. Co. 735 Balley Balley Meter Co. 385 Balley Meter Selectory Sele	American Bitumula & As- phait Co
American Wheelabrator & Equip. Corp. 1 Ampco Metal Ins	American Optical Co 6 American Platinum Works American Pulverizer Co. LT478
Arrow-Hart & Hegeman Elec, Co. 302 Atlas Powder Co. 285 Habcock & Wilcox Co. 118-118 Hailey Meter Co. 285 Habcock & Wilcox Co. 118-118 Hailey Meter Co. 25 Habcock & Wilcox Co. 118-118 Hailey Meter Co. 25 Harcock Mig. Co. 25 Harcock Mig. Co. 25 Harcock Mig. Co. 25 Harcock Mig. Co. 29 Harcock Mig. Co. 29 Harcock Mig. Co. 29 Harcock Mig. Co. 27 Ha	American Tool & Machine Co. L456 American Wheelabrator &
Arrow-Hart & Hegeman Elec, Co	Ampeo Metal Ina
Barrett Div. Allied Chemical & Dye Corp. 443 Rauer Bros. Co	Arrow-Hart & Hegeman Elec. Co
Black, Sivalls & Bryses, 55 Blaw Knox Const. Co. 21 Roston Woven Hose & Rubber Co. 14 Brookfield Engrg. Labs. 16 Blaw Knox Const. Co. 14 Brookfield Engrg. Labs. 16 Bridgeport Brass Co. 14 Brookfield Engrg. Labs. 16 Brown & Root Inc. 251 Buell Engrg Co. 76 Buffalo Pumps Inc. 16 Buffalo Pumps Inc. 16 Buffalo Pumps Inc. 18 Cambridge Wire Cloth Co. 236 Cambridge Wire Cloth Co. 236 Carbide & Carbon Chemical Co. Div. Union Carbidge Carpenter Steel Co. 25, 368 Carrier Corp. 52-83 Cash Co. A. W. 239 Celanese Corp of America. 412 Contury Electric Co. 249 Chapman Valve Mfg. Co. 30 Chemsteel Construction Co. 16 Buffalo Buffalo Control of Chicaso Eye Shield Co. 1742 Chicago Pneumatic Tool Co. 76 Clark Equip. Co. R461 Clarage Fan Co. 89 Cleaver-Brooks Co. 257 Cleveland Worm & Gear Commercial Solvents Corp. 253 W. R. Connor Engrg. Supp. 446 Communication Engrg. Supp.	Rarrett Div. Allied Chem- ical & Dye Corp
Brookfield Energ. Labs. Inc. RB454 Brown & Root Inc. 251 Buell Engrg Co. 70 Buffalo Meter Co. R451 Buffalo Pumpe Inc. 16 Buffalo Pum	Black, Sivalla & Bryson, Inc. 256 Blaw Knox Const. Co. 21 Boston Woven Hose & Bub.
Cambridge Wire Cloth C. 1848 Cambo Products Inc	Brookfield Engrg. Labs. Inc. R1854 Brown & Root Inc. 251 Bruell Engrg Co. 70 Buffalo Meter Co. R451 Buffalo Pumpe Inc. 16 Buffalo Meter Co. R451 Buffalo Pumpe Inc. 16 Buffalo Ready 10 Buffalo Ready
Chemical Construction 411 Chem. Steel Const. Co. 465 Chicago Bridge & Iron Co. 106 Chicago Breumatic Tool Co. 84 Clark Equip. Co. 84 Clark Equip. Co. 89 Cleaver-Brooks Co. 257 Cleveland Worm & Gear Chicago Bridge Co. 106 Commercial Solvents Corp. 253 W. B. Connor Engrg. Corp. 54 Consolidated Enginering Corp. 54 Contilental Can Co. 217 Cooper Alloy Foundries. 227 Cooper Alloy Foundries. 227 Cooper Alloy Foundries. 228 Cooper Alloy Foundries. 228 Cooper Bessmer Corp. 255	Cambridge Wire Cloth C. C. 236 Camoo Products Inc. R455 Carbide & Carbon Chemical Co., Div. Union Carbide & Carbon
Combustion Engrg. Super- heaters Inc	Chemical Construction 411 Chem. Steel Const. Co. 405 Chicago Bridge & Iron Co. 190 Chicago Eye Shield Co. 7342 Chicago Pneumatic Tool Co. 26 Clark Equip. Co
Cooper Alloy Foundries 226 Cooper-Bessmer Corp 325 Cooper-Bessmer Corp 325	Combustion Engrg. Super- heaters Inc. 94-95 Commercial Solvents Corp. 253 W. B. Connor Engrg. Corp. 81 Consolidated Enginering
	Confidental Can Co. 177 Cooper Alloy Foundries. 258 Cooper-Bessmer Corp. 255 Corpus Energ. Corp. 315 Corning Glass Works. 32-32 Crane Co 246 Crane Packing Co. 1846 Crouls-Hunds Co. 100-1146 Crouls-Hunds Co. 100-1146 Crouchis Steel of America. 365 Dunphay Co. The . 218 Danguage Co. The . 218 Danguage Co. The . 218 Danguage Co. The . 218

bout products of these advert
Darling Valve & Mfg. Co361 Darnell Corp. LtdR452 Davison Chemical Corp., The
J. H. Day Co., The
Dodge Mfg. Corp428 Dorr Co276-277
Dowell Inc
Downingtown Iron Works, Inc. 425 Draceo Corp. 286 E. F. Drew & Co., Inc. 265 E. I. du Pont de Nemours. 277 Duraloy Co. 324 Duriron Co. Inc. 291 Eastern Industries Inc. B234 Ebert Electronics Co., RT466 Eclipse Fuel Engineering Co. 458 Electric Auto-Lite Co., T234
Elliott Co
Farrell Birmingham Co.
Inc. 112 Farris Engrg. Corp. 343 Fenwall Inc. 427 Filtration Engineers Inc. 334 Fisher & Porter Co. 463 Fietcher Works Inc. T348 Flexitallic Gasket Co. 244 Flexonics Corp. 466
Floridin Co
Flexonics Corp.
Fruehauf Trailer Co
Chem. & Dye Corp111 General Electric Co. 52, 53, 86-87, 130-131, 423
Aviation Corp. Fruehauf Trailer Co. 415 Fuller Co. 420 Gardner-Denver Co. 420 Genoral Armer Co. 420 Genoral Armer Co. 420 Genoral Armer Co. 420 Genoral Electric Co. 410 General Electric Co. 72 Gifford-Wood Co. 72 Gifford-Wood Co. 46 Gilbert & Earker Mig. Co. L462 Globe Steel Tubes Co. 46 Glycerine Producers Assoc. 293 Golden Anderson Valve Specialty Co. 355
Goodyear Tire & Rubber. 17 Goulds Pumps Inc L454 Greer Hydraulics Inc 336
Hammond Bag & Paper . T294 Hardinge Co., The
Hassall John Inc
Helicold Gage Div. Amer. Chain & Cable Co
Ingersoil-Rand
106-107
Jackson & Church CoT363 Jefferson Chem. Co., Inc., 96 Jeffrey Mfg. Co376
Jenkins Bros

See B. J. C. J. Bostone
sers, use Reader Service postcar
Kalamazoo Tank & Silo Co. Keasbey & Mattison Co. 422 O, G. Kelley & Co. 24 Kemp Mfg. Co., C. H. 335 Key Co. 338 Kidde & Co., Walter 232 Kinney Mfg. Co. L482 Maurice A. Knight. 224 Konje Hold Mfg. Co. 228 Koppera Co. Inc. 20, 58, L438 Koven & Eroa. Inc. 1. O 336 LaBour Co. 435 Labour Co. 1375 Lapp houlator Co. 1445 Lepane Bowler Co. 1445 Lepane Bowler Co. 1445 Lepane Steel Foundry 1447
Koven & Broa. Inc. 1. O. 386 LaBour Co. 4300 Ladish Co. 375 Lapp Insulator Co. 132 Lawrence Mach. & Pump Corp349 Layne Bowler Co. L445 Lebanon Steel Foundry. L447 Leslie Co11, 43, 137 Liquid Carbonic Corp. 323 Liquidometer Corp. B356 Littleford Bros. Inc. 328 Louisville Dryer Div. of Gen. Amer. Trans. Corp. 211 Lubriplate Division Fiske Bros. Refining R7464 Lukens Steel Co. 366
Manning Maxwell & Moore Inc. 50 Manton-Gaulin Mfg. Co. 98 Marconi Inst. Ltd
McGraw-Hill Book Co430 McGanahan & Stone Corp 62 McGuay Inc
ulator Co., Industrial Div. Mixing Equipment Co. Inc. 215 Monarch Mfg. Works inc. R446 Monsanto Chemical Co. 114-115 Nagle Pumps, Inc. — 7306 Nash Engrg. Co. — 6. 43 Natt. Airoil Burner Co. — 14 Natt. Airoil Burner Co. — 43 Natt. Carbon Div., Union Carbide & Carbon Div., Union Carbide & Carbon Corp. 289 National Distillers Chem. Co. — 71 Natl. Engrg. Co. — 316 National Filter Media Corp. 351 National Filter Media Corp. 351 National Fluer Media Corp. 351 National Foam System Inc. 300 Neptune Meter Co. — 225 Neptune Pump Mfg. Co. L4466 New England Tank & Tower
Niagara Alkali Co. 2237 Niagara Filter Corp. 47 Nichols Engrg. & Research 22 Nicholson & Co. W. B. 22 Nicholson & Co. W. B. 22 Nicholson & Co. W. B. 23 Nicholson & Co. 4440 Oldbury Electro-Chem. Co. Tisso
Omega Machine Co101 Owens-Illinois Glass Co37 Pabeo Products Inc308 Patterson-Fdry. & Mach. Co. Fourth Cover
Peerless Pump Division Food Mehy & Chemical Corp. Penberthy Injector Co
Permulti Co. 331 Pfaudler Co. 331 Pfaudler Co. 207 Pfizer & Co. Inc., Chaa. 370 Philadelphia Gear Works Inc. 40 Phila Quartz Co. 1334 Pick Mfg. Co. L458 Pittsburgh Coke & Chem.
Pittsburgh Code & Chem. Co. Pittsburgh Lectrodrysr. 429 Corp. Corp. Corp. Powell Co., Wm
AND MUNICIPAL MERITAGE AND

in section following
Raymond Pulveriser Div., Combustion Engrg. Co246 Reliance Electric & Engrg.
Republic Steel Corp 67, 399 Research Corp
Corp
Ross Heater & Mfg. Co 66 Russell & Stoll Co. Inc. B348 Ryerson & Son Inc. J. T. 140 Sandvik Steel Inc 319 Saran Lined Pipe Co 327 Sarco, Inc
Simpson Mix Muller Div., Natl. Engrg. Co
Spray Engrg. Co
Stokes Machine Co., F.J., 279
Stephens Adamson Mfg. Co.
Sun Snipbullding & Dry
Dock Co
Dock Co. 432 Superior Combustion Ind. Inc. L.T464 Superior Electric Co. 395 Swartwout Co. 217 Swenson Evaporator Co. 4.7 Swenson Evaporator Co. B448
Tank Storage Terminals, Div of Gen. Amer. Trans-
Texas Gulf Sulphur Co. Inc. 95 Thermo Electric Co T262 Titeflex Inc
Amer. Trans. Corp 235 Uehling Instrument Co 478 Union Bag & Paper Corp 15 Union Carbide & Carbon Corp. Carbide & Carbon
Chem. Co
U. S. I. Chemicals Co
Walworth Co
Warren Steam Pump Co. Inc. 116 Watson Stillman 419 Weiding Fitting Corp. 393 Weisbach Corp. 310 Westinghouse Elec. Corp. 78-79, 136 Westinghouse Electric Corp.
Stuntowest Tiles 201
Sturtevant Div. Weston Electrical Instru- ment Co. Wheeler Mfg. Co., C. H. 414 Whitlock Mfg. Co 322 Williams & Co., C. K 227 Williams & Co., C. K 227 Williams Fatent Crusher & Pulverizer Co 44 Wolverine Tube Div. of Coulmet & Copper Co. 408 Worthnatton Pump \$2, 256 Worthnatton Pump \$2, 256
Wyandotte Chem. Corp. 91, 133 Wyssmont Co. B294
Tarnell-Waring Co T298, 421 FOR CLASSIFIED INDEX

Chemical Engineering Reader Service

HOW IT WORKS

Mail the post card below. Before mailing, circle page numbers of items about which you want more details. Then write your name and address on other side of card and mail to us. Your requests will be forwarded to companies concerned, the answer coming direct to you.

TO MAKE IT HANDY

Products and literature in this issue are listed on these pages. There are two indexes. (1) editorial items on new equipment, new products, new literature; (2) products advertised. The index of advertisers is on the proceeding page.

NUMBERS EXPLAINED

Advertisements: There is a page number on the postcard for each advertisement. Before the number, may appear. L. R. T. B (left, right, top, bottom) locating the ad on the page; small letters following (a, b, c) indicate additional products in the advertisement.

Editorial Items:—Numerals are page numbers; the ABC's distinguish among items where more than one is on a page. There is a number on the postcard for each item in three editorial departments: Equipment News, New Products, and New Literature.

EDITORIAL ITEMS

For more data, circle item number on postcard.

NAME OF TAXABLE PARTY.	1,50
NEW EQUIPMENT	
Abrasive Pump Parts	72.5
Agitator Drive	5.5
Air Different	5.5
Air Diffuser	2.0
Alkylation Contactor	20
Aluminum Tubling	12.9
ATTORNEY WAS ASSESSED.	13.5
Automatic Weighing System.	9.0
Rag Filters	
Reflects Commentee	911
Rellows Connector	211
Beta-Ray Gage	32:
isin Level Indicator	325
t ministible the Alarm	221
CO: Recorder	
COs Recorder Conveyor Section	

CONTRACT TOWARD	
Deafting Tool Electronic Computer	2261
Electronic Computer	999/
Patrice Section 4 American	17 1 40 34
News Plan Valva	10 T IS A
Gas Powered Trucks	0100
Globe Valve	2214
Heating Tape High-Pressure Pumps Hopper Car Unloader Identification System Indicating Starter	21.00
High-Pressure Donne	0.7.00
Honney Car Unloader	- 2180
Identification System	-21213
Indication Startes	2160
Indicating Starter	- 22719
Laminating Press Level Alarm	216F
Level Alarm	-225C
ANDREA LOVEL FAREN	
Mobile Electric Crane	2126
Multi-Stage Turbines	99767
Mobile Electric Crane Multi-Stage Turbines Orlen Work Clothing Packaged Steam Generator	216D
Packaged Steam Generator .	21813
pH Meter	20074
Plastic Pipe	27.567
pH Meter Plastic Pipe Plastic Truck Platform Adapter	27.473
Platform Adapter	21911
Positive Displacement Pump Pressure Filter	21011
Pressure Filter	
Refractometer Rellef Valve Rollover Clamp	- 225 A
Rellef Valve	-22012
Rollover Chron	-218F
Rotameter Please	- 2121
Rotameter Floats Safety Valve	222A
Shelyt, Plane, Leaking ton	216A
Small Class ThatCator	.221D
Should thus Turoine	.026C
Sight-Flow Indicator Small Gas Turbine Speed Reducers	.227B
Storage Cabinet Tenite Fittings	ZI2C
Tentre Pittings	21417
Tower Packing	12 T 44 EN

USE THIS HANDY POSTCARD

Circle desired item, fill in reverse side, tear out and mail

Adver	tiseme	mts			R	EAI	DER	SEI	RVIC	EP	reor	CA	RD						
3	81	68	85	102a	183	215e	228	263b	258	204	333	T343	D\$58	875	899	4180	430	B447	B
4-5	32-33a	89	86-87			2158	339a	268	396	T208	324	B348	357	879a	400	4136	431	L448	T
6	82-33b	60-61a	88		134-135a		3395	T288	387a	B308	838	848	T358	375b	401m	414m	488	31448	33
9	32-33e	60-61b	89a	106-107	134-135b	219	2390	B266	287b	207	827	T344	B358a	379e	401b	414b	434	L449	£
8	32-334	60-61e	89b	109	134-1350	220	2394	267	287e	308	828	B344	B356b	280	4010	418	435	R449a	7
9	22-23e	60-614	Sign .	111	184-135d	221	244	209	2874	809	829	845	359	861	4014	418	435a	E449b	B
10	34	80-61e	896	113	184-135e	223	248	271	289	810	330a	T346	360	862	403	417	436b	R4400	T
11	35-35a	63	8Ge	118	184-1386	224a	246	273	291	811a	8305	B346	261	263a	403a	418	435e	B4490	B
12	35-36b	6.8	90a	114	134-135g	224b	249	274	293	811b	330e	847	362	B83b	403b	419	4360	480	L
13	87	64-65	90b	115	184-1355	228	251	278	293	813	8304	T348	354	283c	404a	420	437	L481	3
84	88	88	90a	338a	136	226	253a	276	T294	814	\$30e	B345a	205	864	404b	421	438	B1481	1
18	39	67	904	116b	187	227	253b	277	B294	815a	831	B348b	367	885	404a	423	439	L453	
10	40-41a	58	Silve	117	196a	231	263c	279	295	815b	833	B348e	358	286a	4044	423a	440a	B489	4
17	60-41b	89	91a	118-119	1880	232	2634	280	298	\$15c	T384	349	869	386b	408	433b	440b	2468	4
18-19	43	70	915	120	138e	233	253e	381	2978	818d	B384	T850	370	887	400a	423a	441	31453a	4
90	44-45a	71	90a	121	1386	T234	3631	303a	397b	315e	335a	D380	873	308	4085	4330	467a	BA\$3b	-
91	44-48b	79	925	123-123a	118e	B234	253g	253b	297e	316	336b	351	876	889	408a	428e	442b	31468a	7
91-23a	46	78	90e	199-123b	1881	235	254	283e	T298	817	335e	T352	376a	890	4080	4231	4430	L484	7
22-23b	47	74-78	93	122-123e	140	236	255	2534	B298	319	836	B352	876b	391	407	434	4420	TR454	
24	46-49	76	98	194	207	287a	267	283e	2090	820	837	353a	376e	233	408	435	448	BR4549	
98	80	77	97	128	211	387b	158	2636	299b	231	839	3635	876d	898	409	426a	644	BR4840	
36	81	19-79	Dila.	126-127a	213	237e	250	288g	200	822a	T340	853e	375e	294	410	426b	L448	L488	1
37	82-53a	88	996	136-137b	218a	2874	261	283h	801	822b	B340	T254	8764	398	411	426e	B448	B455	1
28	82-535	63	99	126-1274	218b	337e	T262	2581	803	332e	841a	D354	\$76g	396	413	437	L446	L486	4
29	54	52-63	100	126-129	3180	3371	B363	2831	T303	8224	841b	866	876h	197	413a	428	B446	TRASS	-
30	86	84	163	180-181	9164	887g	20%a	384	31303	833o	8410	T356	3784	308	4180	430	L447		
Edito	rial I	tems																	
208.A	210D	\$13D	214A	318C	118B	21823	2210	232D	925B	226B	227D	MPER	230C	234D		2983	2259	288G	1
209.4	210E	2128	3143	316D	219C	319A	321D	222E	225C	2260	227M	229B	232A	236A		236K	238C	238H	1
2098	210F	212F	314C	316E	SIND	319B	222A	2229	225I)	227A	227F	338C	234A	28"	2360	236L	238D	2362	
310.4	912A	313G	214D	216F	218E	221A	222B	224A	235E	227B	228A	230A	334B	235		235M	238E	286J	1
910B	2138	212H	216A	3180	\$16P	221B	333C	225A	326A	227C	2260	2809	234C	\$38D	3861	388.A	234.F	230 K	;
310C	9190	9131	316B	918A	9190														

	Page
Vacuum Tube Voltmeter	225B
Varor Parifler	21010
Variable Smood Drive	227E
Vacuum Tube Voltmeter Vapor Purifier Variable Speed Drive Vinyi-Coated Gloves	216C
Webling Fittings	22114
Westing Fittings Westing Machine	227F
	Page.
NEW PRODUCTS	2.000
Bringaeiting Pitherglass Fabric Film Base	TOTAL
Filterglass Fabric	2246
Film Base Glass Paper	228 X
Glass Paper From Remover Putronium 242 Polyvinyi Chloride Propanediola Resin Sequestering Agent Surface Active Agents	234A
Fron Remover	220C
Delgojand Chloride	234H
Proposition	229C
Propin	22913
Sequestering Agent	234D
Surface Active Agents	22013
Triallyl Cyanurate	. 229A
Triallyl Cyanurate Weed Killers	22845
NEW TECHNICAL LITERATURE	
Air Conditioning	2263
Antioxidanta	, 238J
Charles and the first of the control	
Controllers	2361
Articordants Construction Materials Controllers Diesters	24916
Diesters	24916
Diesters	24916
Diesters	24916
Dissiers Dryers Filtration Fork Trucks Heating Coils	236J 236J 236K
Dissiers Dryers Filtration Fork Trucks Heating Coils	236J 236J 236K 236K 236A
Diesters Dryers Fütratier Fork Trucks Heating Coils Heat Exchangers Instruments	236J 236J 238B 236K 236A 238E
Diesters Dryers Filtratior Fork Trucks Heating Coils Heat Exchangers Instruments Instruments	236J 236J 236K 236K 236A 238E 238N
Diesters Dryers Piltratior Pork Trucks Heating Coils Heat Exchangers Instruments Instruments Motors Motors	236J 236J 236K 236K 238E 238E 238N 236D
Diesters Dryers Filtratior Fork Trucks Heating Coils Heat Exchangers Instruments Instruments Motors Flasticiters	238Q 236J 238B 236K 236A 238E 238N 238D 236C
Diesters Dryers Piltratior Pork Trucks Heating Coils Heat Exchangers Instruments Instruments Motors Plastititions	238Q 236J 238B 236K 238E 238E 238D 238D 238G
Diesters Dryers Filtratior Fork Trucks Heating Coils Heat Exchangers Instruments Instruments Motors Flasticitiers Foduction	238Q 236J 238B 236K 236K 238E 238D 238D 238C 238G 238H
Diesters Dryers Piltratior Pork Trucks Reating Coils Reat Exchangers Instruments Instruments Motors Plasticitors Pollution Pumps	218Q 236J 218B 216K 216A 218E 218N 216D 218C 218G
Diesters Dryers Piltratior Pork Trucks Reating Coils Reat Exchangers Instruments Instruments Motors Plasticitors Pollution Pumps	238Q 236J 236K 236A 238E 238N 238D 238C 238G 238G 238H 236H
Diesters Dryers Piltratior Pork Trucks Reating Coils Reat Exchangers Instruments Instruments Motors Plasticitors Pollution Pumps	238Q 236J 238B 236K 238C 238C 238C 238G 238H 236H 236F 236F
Diesters Dryers Piltratior Pork Trucks Reating Coils Reat Exchangers Instruments Instruments Motors Plasticitors Pollution Pumps	236J 236J 238B 236K 238C 238C 238D 236C 238H 236H 236H 236F 236E
Diesters Dryers	236J 236J 236K 236K 238E 238E 238D 236D 238G 238H 236H 236F 236G 238G
Diesters Dryers Filtratior Fork Trucks Heating Coils Heat Exchangers Instruments Instruments Motors Plantitiers Pollution Fumpe Resins Steam Generators Steam Generators Steam Generators Steam Generators	236J 236J 236B 236K 236C 238D 238D 238D 238D 238H 236H 236H 236E 236E 236E 236M
Diesters Dryers Piltratior Pork Trucks Heating Coils Heat Exchangers Instruments Instruments Motors Plasticiters Pollution Pumps Resins Stoam Generators Stream Generators Stream Generators Stream Plants Strain Plants Strain Plants Strain Plants	236J 236J 238B 236K 238C 238C 238C 238C 238G 238H 236H 236E 236M 238I 238I
Diesters Dryers Filtratior Pork Trucks Heating Coils Heat Exchangers Instruments Instruments Motors Plantitiers Pollution Plantitiers Resins Steam Generators Steam Generators Steam Flants Strainers Tabe Fittings	238Q 236J 238B 236A 238E 238D 238D 238D 238G 238H 236H 236F 236M 238M 238M 238M 238M 238M 238M 238M 238
Diesters Dryers Filtratior Pork Trucks Heating Coils Heat Exchangers Instruments Instruments Motors Plantitiers Pollution Plantitiers Resins Steam Generators Steam Generators Steam Flants Strainers Tabe Fittings	238Q 236J 238B 236A 238E 238D 238D 238D 238G 238H 236H 236F 236M 238M 238M 238M 238M 238M 238M 238M 238
Diesters Diryers Filtratior Peek Trucks Heating Coils Heat Exchangers Instruments Instruments Motors Plasticiture Pollution Pumps Resins Salvent Extractors Steam Generators Steam Generators Steam Fairs Strainers Tabe Fittings Vacuum Equipment Valves	238Q 236J 236A 238E 238D 238D 238D 238D 238D 238D 238E 238C 238G 238M 238H 236F 236S 236M 228F 238M 228F 238M 238M 238M 238M 238M 238M 238M 238M
Diesters Dryers Filtratior Fork Trucks Heating Coils Heat Exchangers Instruments Instruments Motors Flasticiters Pollution Planticiters Pollution Plantic Steam Generators Steam Generators Steam Flants Steam Flants Tube Filtings Vacuum Equipment Vacuum Equipment	238Q 236J 236A 238E 238D 238D 238D 238D 238D 238D 238E 238C 238G 238M 238H 236F 236S 236M 228F 238M 228F 238M 238M 238M 238M 238M 238M 238M 238M

PRODUCTS ADVERTISED

For more data, circle item number on postcard.

	Page.
Adaptors, chemiseal	330e
Air cleaning & dust recovery equipmer	3.0
Dorex air recovery	81
Dust collectors	900
	70
Dust collection systems	996
Dust control equipment	Y 461
Dust filters, bulletin 98	7401
Dustube collector, catalog 72-B	1001
Furne control systems	1.001
Multi-wash, builetin 551	J.240
Precipitators, electrical	1,460
Precipitators, electronic	20
his conditioning coulmnent	
Ate conditioning coils 126	-127a
Air conditioning units 126	-127b
Drafts, mechanical	. 89e
Exhausters	890
Fans Aerodynamic	1.448
Aerodynamic	890
Cast from	900
Industrial	900
Mechanical draft	204
Ventilating	0.550
Fans and blowers	2128
Gyrol fluid drives	200
Multitherm units	- 930
Aircraft components, stainless steel.	. 405D
Barrel packers	. 276h
Hellows	
Expansion-type	114
Stainless steel	.406c
17-71-	
V	8
V. grommet	
Historia	
Air & gas, turbo-type Centrifugal 27-22b,	
Conteirum 72-22b.	263a
Rotary	7631
Steam	95.7
Steam Water tube, 2 drum, bulletin SE38	17 00
Water tube, 2 drum, numerin Sisas,	F
Burners	222.4
Gas	1200
Gas, direct fired	15266
Gas, oil Carbon, activated 75	BIDE
Carbon, activated	292
Casters & wheels	.E4432

	Page
astings	
High alloy	324
High alloy & specification steel	. 282
Steel	1,447
atalysts, platinum metal	10
atalyst supports, spheres, rings or	
pellets	4400
entrifugals	
Centrold speed control	T348
Continuous	9.0
Laborators	Y 456
Laboratory	43
mains, rough	2760
procket attachments hemical plants, ammonia synthesis	.0100
nemical plants, ammonia synthesis	0-61d
	0-910
hemicals	
Accelerators, delayed-action,	
NOBS #1	0-61b
Adsorbents, bauxite-based	. 299b
Alcohols	.2538
Alumina, activated	59
Amines	.253b
Aminohydroxy compounds	253c
Aroclors, metal surface	
protection	₹-135e
protection	4-135c
Benzoic acid, dyeing assistant.13	1-135b
Calcium chioride	431
Carbon dioxide	323
Carbonate of potash	237c
Caseins	60-61e
Catalysts, oxidation	397
Caustic potash	2375
Caustic soda	237c
Chlorine, liquid	237a
Coal-tar	4.43
DDT	63
Defoaming agent, AE-1	4-1256
Santomerse #1	4-1253
Diglycols, mixed	910
DL-Methionine	25.261
Electro-chemicals	9950
Electro-chemicals	0704
Esters	2030
Ethylene glycol	
Fatty acids, eoconut	265
Fullers earth	2990
Furfural	267
Gluconic acid	370
Character and Therese are	207
Glycerine	2534
Hydroxylammonium salts	
Insecticides, weed & brush killer	8.,120
Magnesium oxide	60-61c
Metal treating compounds	60-612

Page	Flo	
Metallic sodium, handling		
Metallic sodium, handling information 71 Monoglycols, mixed 991b Nitrohydroxy compounds 534 Nitroparadins 534 Paradichiorobenzene derivatives Plasticiaer extender, Hill-44 Plasticiaer extender, Hill-44 Plasticiaer extender, Hill-44 Propionic acid 534 Propyleine glycol, U.S.P. 14-75 Interpretation 534 Resins, piccolystic 534 Resins, pi	Page Page	Ejectors Jet, bulietin 5080 404d Steam jet, catalog 1462 414a Elevators, bucket 276b Engineering & construction Filants 251 Refining, natural gas & chemical plants 220 Engineering & design, petroleum processing units 221 Engineering & design, petroleum processing units 221 Engineering & design, petroleum processing units 221 Conkey 422 Fabricators Heat transfer apparatus 425 Fressure & thermal reaction vessels 21 Prossure & thermal reaction vessels 21 Engineering engineering 221 Fressure & thermal reaction vessels 21 Fressure & thermal reaction vessels 22 Fressure & thermal react
Compression 1	Dryers	String discharge, bulletin 103 354 Vacuum 9 Fire extinguishers R449h Cartridge operated R449h Chemical foam R449h Dry chemical with the string S44 Dry chemical tow temperature T358 Vaporiting House
Condensers, "self-cleaning"	With activated alumina439	Fire extinguishing systems Carbon dioxide

USE THIS HANDY POSTCARD

Circle desired item, fill in reverse side, tear out and mail

Adver	tiseme	ents			R	EAI	DER	SEI	RVIC	E P	POST	' CA	RD						- 1
1	81	58	88	103a	189	218e	, 230	2030	268	804	323	T342	D356	878	199	4130	430	R447	BRAN
1-8	22-33a	59	88-87	102b		2150	239a	255	286	T208	324	B342	357		400	4134	431	L448	TL487
1	32-33b	60-61a	88	108	134-135a	217	239b	T266	287a	B306	825	848	T388		401a	414m	488	31448	R457
	32-33e	60-61b	89a	108-107	134-135b	219	2290	B266	287b	807	827	T344	B358a		401b	414b	434	L449	L488
3	32-83d	60-61e	890	109	184-185c	220	2394	267	287a	308	328	B344	B358b		401e	418	435	R449a	TR48
9	32-33e	60-614	89e	III	134-1358	221	244	259	287d	809	329	845	359		4010	416	436a	R449b	BR48
10	34	60-61e	89d	113	\$84-155e		345	271	289	810	330a	T346	360		403	417	436b	R4400	T459
11	85-36a	62	89e	118	134-1351	224a	248	273	291	Slia	8306	B346	261		603a	418	435a	R449d	B459
12	35-36b	63	90a	114	134-135g	224b	249	274	293	311b	830e	347	362		403b	619	4360	4.80	1460
13	87	64-68	90b	118	184-135b	228	251	375	293	813	8304	T348	364	383c	404a	420	437	L481	TR45
14	88	66	90e	116a	136	226	258a	276	T294	814	330e	B348a	368	864	404b	431	438	Real	L461
1.5	39	67	904	116b	187	227	253b	277	B294	815a	331	B348b	367	885	404e	423	420	L453	463
16:	40-41a	68	90e	117	128a	231	253c	279	298	815b	232	B348e	368	\$85a	404d	423a	640a	N483	4684
17	40-41b	69	91a	118-119	1885	232	2534	280	296	\$15c	T334	849	369	886b	408	4230	440b	L463	463b
18-19	43	70	916	120	138e	233	253e	281	297a	818d	B334	T350'	270	887	405a	423e	641	R453a	463a
10	44-45a	71	92a	121	1884	T234	2631	253a	297b	815e	335a	B380	373	368	406b	4234	443a	R453b	4630
81	44-45b		92b	132-138a	138e	B234	253g	283b	2970	816	835b	351	876	869	406e	4230	442b	R4680	TL46
12-236	68	78	92e	122-123b	1881	286	254	253a	T298	817	835e	T352	376a	890	6064	4231	6430	L484	TR46
13-23b	47	74-78	98	122-1230	140	236	358	2836	B298	819	836	B352	876b	891	407	424	4434	TR484	TL46
14.	48-49	76	96	134	207	387a	287	283e	299a	820	837	353a	876e	802	408	428	448	BR454a	
9.6	80	77	97	128	211	287b	288	2831	2995	821	839	863b	8764	898	409	426a	444	BR484b	
26	51	78-79	98a	126-127a	218	337e	289	353g	300	822a	TRAC	353e	276e	394	410	426b	1.448	£458	B478
37	82-58a	80	685	126-1276	215a	2874	261	263h	801	823b	B340	T354	3761	326	411	426e	B448	R458	470
25	52-53b	81	99	126-127e	216b	2870	T263	2831	803	3220	841a	B354	\$76g	396	412	437	L448	L456	491
29	84	52-63	100	138-129	215e	2371	F1262	2831	T308	8224	841b	355	876b	397	418a	438	B446	TRADE	457
80	88	84	103	180-181	3166	2374	958a	184	11303	823a	8410	T366	3761	303	418b	439	2447		
Edito	rial I	lem#																	
ABOU	\$10D	113D	214A	918C	2180	210E	331C	323D	228B	226B	237D	229A	230C	234D		2262	238B	238G	2281
209A	210E	213E	214B	216D	218C	219A	221D	222E	225C	226C	227E	229B	232A	236A	236F	336K	238C	336 H	2253
209B	210#	212F	214C	216E	218D	219B	222A	222F	228D	227A	227F	229C	234A	236B	2380	236L	238D	3381	2381
AOIE	212A	2190	314D	216F	218K	221A	222B	224A	225E	227B	225A	230A	2340	236C	336H	235M	236E	388J	2861
\$10B	212B	212H	316A	3160	215F	231B	223C	225A	226A	227C	226B	\$900	88	\$36D	1862	286A	206F	383 K	2354
129C	913C	9133	3169	218A	9190														

	F'AL
Foam type	30
Fluo-solid system for sulphur dioxie	Se 27
Freeze-drying equipment, varioum.	27
Fittings	
Conject and	282
Conical end Connectors, aligning, corresion-	
realist and	176
resistant Trop forged steel.	4.3
Flanges, insert, corresion-resistant	470
General line	1420
Joints	
Ball, bulletin 215	407
Chamberly 210	77.0
Chemiscal, expansion Packless type, expansion Revolving, bulletin 3-8	3.00
Packing type, expans a	100
Parties, bulletin and	400
Swing Swivel, bulletin 265.	101
SWIVE, bulletin 264-	910.3
Long tangent Prefabricated	201
1 containment of	100
Reducing	287
Sanitary Type	287
Screwed	18
Short radius	28.9
Short radius Stainless steel	R41
Unions, tube	171
Webling 2 4 Webling, alloy steel Webling, 55 and 165	6, 31
Welding, alloy steel, Welding, 55 and 185 Welding, replays-type	
Welding, 56 and 105	
As amidiated Society a - Children	282
(Inchiete	
Chembeal.	
Ancheted	.739
SUp-joint	
SUp-joint Sup-joint Sup-joint Superint	
Charles catalog PX-33A.	41
X pline	
to the arranged	24
"room, for cooling tower fan-	
Organia altreron & argum.	LTIS
O-yan olteren & argen.	TT_16
Gilliano ha	F2 47
Tank, platecoil, bulletin P61	
Water, instantaneous	1.45
Tank platecoil, bulletin P61 Water, instantaneous Unit 90b, 12	6-127
Heat exchangers	
Carbon tubed	
Sampling	200
Stainless steel, manual \$37 Stainless steel tube side	
Stainless steel tube side	399
Standard type ST	200
Standardized	
Heating systems. Dowthorn	11

	Page
Ī	Heating units, thermo-deck, bulletin 97B7812 83
)	Tosas
	Flexible metal
	Rubber, acid-conducting
	dlers, conveyor belt
	Autronic control system
	Control systems, electronic bulletin
	Control, used with flowrator meters, catalog 50 1634
	Feed water meter
	Flow meters
	Evenly graduated, catalog 231-1 122-123-
	Mercury manometer, catalog 27, 4621 Square root, catalog 2022, 122-1235
	V/A cell entalog 42 463e Flow transmitter, differential con-
	Flow transmitter, differential con-
	terfer, catalog 2281 122-123a
	Heated
	Hellevid 3st Pressure 3st
	Pressure
	Tank Hills
	Liquid measuring meters, stainless, steel F155
	sizel Liquid meters, automatic stop, bulle- tin 566-H
	Mass spectrometer analysis, bulletin CEC-1813
	Measurement & control 21 pH meters T455
	Pressure & temperature, bulletin
	5000
	Dynameter, type HP-3 bulletin
	Geording, indicating & controlling
	1717.473
	Relays, mercury Resistance bulb, bulletin CEC-853, 4735
	Besistors, temperature responsive Hills
	Ring balance meters
	Spectrophotometers, model 21. 245 Stress analyzing polariscope. 73
	Tank meters, bulletin 945 11478 Temperature control, catalog 200 267
	Temperature control, catalog for 367
	Temperature indicators, bulletin (TEC-218B 423)
	Temperature recorder catalog
	G-143-R T23) Thermocouple assessaries, bulletin BEC-714 423d
	Thermocouple potentiometer, buile-
	thermocoupie potentiometer, bulle-

	age
tin GEC-245	123c
Thermometers	
All-metal, contact making	10.30
All-metal, standard, industrial	
All-metal, maximum-minimum	
Resistance, bulletin GEC-8354	200
Thermostat Transmitters, pneumatic, F/CTE	427
Transmitters, pneumatic, F/CTE	1454
Viscometers	15-821
Voltage regulators, automatic, bulle-	
tin 8251	
Insulation	
Heat, calcium silicate	
Hear 85% magnesia 208	4
HV-torno with 85% magnesia	
Kilns, rotary	
Lenses, plastic, for safety goggles	
Lighting fixtures Dust-tight B Explosion-proof B Vaportight B Libriograph	1480
Explosion-proof	1480
VaportightE3	480
Corrosion resistant, No. 100TI	2484
Greeners, stanelith	1971
Greases, stanelith Industrial eils, stanelith	1971
Viscous, calumet	97-
Bulk chemicals	23.43
Bulk materials 7	
"Mechanical hands"	236
At a twenty line of a computer and horn	
Aluminum bronzes	1.65
Aluminum for process equipment.	200
Asbestos transite, corrugated	
Chambra transmine, corrugateri	
Chemical stoneware Copper	
Validate, "service and a service and a servi	200
titass, for plant equipment 32	
Gold Hayer structural plastic, for corre-	LDED
Harvey structural plactic, for corre-	-
sive handling equip.	
Hard rubber Laminated plastic Nickel alloys 5 Platinum III	
Laminated plastic	22.410
Nickel alloys	4-07
Platinum	n S d l
Silver Stainless No. 20	
Stainless No. 20	. 28
Etraficht risrome stainless steels	1.64
Tantalum	27.1
Thermosetting plastic, Enrup	435
Tygon, for sheets, gaskets	
Mixers, furbo-type	
Mixing equipment	
Agitators	450
Dienders	4100
Dry	
1957	a Se

Page	Page	Page
Dry. twin shell	Feeders, weighL463 Pulp pressesT303	Selectro bookiet
Mixers Banbury, bulletin 189 112	Pumps Acid, centrifugal, bulletin E-7000412 Acid handling, series R, bulletin P/I 291 Automatic priming T306 Centrifugal 359 Centrifugal 369 Contrifugal Bulletin CL-339 Bulletin CL-339 253 Self-priming 480 Stainless steel, bulletin 735.3 1.454 Chemical apportioning T246e	Fluid, automatic cleaning
Side entering bulletin B-7821&c Top entering	Chemical, bulletin 982 16 Cycling jet, bulletin 5030 404b Direct flow 383 Pedestal mounted, bulletin 5237548.261 Plunger, rotating L453 Polyethylene BR456 Rotary, folder 52SC B262 Rotary, acrew-type 417	Tubes Condenser, copper & copper alloys. 273 Flow
Motors	Rotex 1165	Finned, bulletin 1614. 84 Metal, electrunite, sinc coated steel. 67 Tubing, flexible metal. 403b Tubing & pipe, stainless steel. 233g Turbine drives, multi-stage, bulletin GEA-5830 . 86-87 Turbines Horizontal . 115b Steam, governor standardised, Type E. bulletin B-2896. 136
Nozzles, spray R448, R459 Perforated sheets T844 Pigments, metallic oxide 227 Pipes & fittings, glass, pyrex, "double- tough" 33-32b	Fused cast 44-45b Bilicon carbide 44-45a Bafety heads 255 Gafety equipment 255 Galoves, neoprene latex 7356 Ehields 7342	Vertical 3150 Valves Back pressure, bulletin 9582290 Balance seal, "8-Minute-Brief"343 Control, series 700, bulletin 700-313 Diaphragm
Glass, pyrex, installation manual, 32-32e Packaged systems B354 Saran lined, steel 227 Stainless steel, light weight schedule 5 863	Screens, gyro-centric 483 Scrubbers, gas, venturi & cyclonic 411 Seals, mechanical, teflon 347 Separators Centrifugal TR458 Magnetic L446	Corrogion-resistant 73, 214 Double-seated, bulletin 513. 68 Packiess, iron body, No. 1611. 245 Float Gage, Grop forged steel, with floating Gatank 4646 Gatank
Wood-lined 238 Plant sites, Birmingham, Ala. 288 Power distribution systems, Expansion bulletin GEA-560053-52b Load-center unit substations, bulle- tin GEA-3592 52-58a Power drives, bulletin LPC. 435	Magnetle	Corrosion-resisting 91 Forged steel 20 Hard rubber lined 361 125-th, flanged end 4220 159-th, Canged end 4420 Liburtial 848
Process equipment, welded pressure vessels for high & low temperatures 118-119 Proportioning equipment	Speed reducers, worm gear, catalog WG-51 Steam traps Steam traps	Lubricated seating surface & hy- draulic jacking action
Electronic weight control system \$89	Freeze proofB184	Cam-sould

USE THIS HANDY POSTCARD

Circle desired item, fill in reverse side, tear out and mail

Adver	tlseme	eimis			R	EA	DER	SEI	RVIC	EF	POST	CA	RD						
2	81	86	88		189		, 238	2630	288	304	823	T343	D356	878	200	419a	480	B447	BR4
4-6	82-834	89	88-87		133	2186	230a	265	298	T308	324	B342	357	379a	400	4134	481	L448	TL4
6	33-33b	60-61a	88	105	134-135a	317	239b	T268	287a	B308	825	343	T288	879b	401a	614a	438	B448	B46
7	33-32e	80-81b	SSa	106-107	134-135b	219	239a	31288	287b	807	837	T344	21300a	379e	401b	414b	434	L449	1.4
8	32-33d	50-51e	595	109	134-135c	220	239d	267	287e	308	128	B344	B358b	850	401e	418	435	B449a	TH
9	83-33a	60-614	990	533	134-1350	221	244	269	2874	809	329	845	309	881	4014	416	430a	B4490	BB
10	34	60-61e	596	113	184-135e	223	245	271	289	310	230a	T346	880	852	403	417	436b	R4490	T4
11	35-36a	62	Sile	118	134-138f	224a	246	278	291	\$11a	830b	B346	861	383a	403a	418	435e	R4490	B4
12	35-36b	63	90a	114	134-135g	224b	249	374	292	311b	\$30a	347	962	8830	403b	419	4350	450	1.4
18 -	87	64-85	905	118	184-135h	225	251	278	298	313	8304	T348	364	383c	604a	430	487	L481	TI
34	88	66	90a	116a	136	228	253a	276	T294	814	\$30e	B348a	865	B64	404b	431	436	R481	24
18	20	67	904	118b	187	337	2530	277	B294	815a	881	B348b	187	383	404s	422	489	LASS	48
18	40-41a	88	90e	337	138a	231	263e	379	295	810b	833	B348e	308	Sida .	4045.	433a	440a	BASE	45
17	40-41b	69	91a	118-119	1885	233	353d	260	298	815e	T334	349	369	385b	408	428b	440b	L458	48
18-19	43	70	915	120	136e	333	253e	281	397a	818d	B334	T300	370	397	400a	4230	443	B453a	46
20	44-450	71	92a	121	1384	T234	2631	263a	2975	315e	835a	B350	878	888	406b	4234	443h	B453b	48
21	64-450		92b	123-123a	135a	B234	25%g	253b	297e	816	335b	351	878	859	406e	423e	642b	R458s	T
32-22a		73	99a	193-1230	1881	235	354	2834	T298	817	335e	T363	376a	890	4066	4231	4420	L454	T
93-23b		74-78	93	123-128e	140	236	355	2634	D298	819	838	B252	876b	891	497	434	442d		T
24	45-49	76	98	124	207	2878	287	283a	200m	\$20	837	363a	376e	892	408	425	443	BR454a	T
25	80	77	97	128	211	237b	258	2831	2995	821	839	\$63b	8764	898	409	425a	646	BR454b	T
96	83	79-79	Dis	120-127a	218	2370	289	253g	300	822n	T340	853e	375e	894	410	426b	L448	1455	B
37	53-53a	80	985	136-127b	215a	3374	261	283h	801	827b	B340	T354	8761	395	411	425e	B448	B455	4
98	23-53h	83	80	126-127e	2160	377a	T263	2531	802	822e	841a	B354	876g	336	619	437	L448	L456	6
29	84	12-61	100	128-129	315e	9371	B261	2891	T303	8236	841b	355	876b	397	413a	438	B446	TRASS	4
80	88	84	163	180-131	9384	137#	208a	384	11000	822a	8410	TRAS	3761	340	418b	430	L447		
Edito	cial I	tems																	
200A	910D	313D	314A	9160	218B	3188		122D	235B	2269	2270	MEER	230C	234D		3963	2360	239G	2
209A	210E	212E	314B	316D	218C	219A		222E	22&C	228C	22715	220B	232A	235A		236K	2380	238H	21
200B	310F	212F	314C	316E	215D	2198		222F	226D	227A	2318	329C	234A	236B		236L	238D	336I	2
\$10A	212A	2120	214D	216F	218E	221A		224A	225E	227B	228A	230A	334B	236C		236M	238E	386J	2
910D	2128	2123	316A	918G	\$15F	331B	222C	335A	326A	227C	836D	REGE	884C	\$56D	3361	386.A	288.F	236 K	8
310C	9190	9123	316D	WIRA	918G														

															ă	re	4	н
Lever-ses	bla	0.0														.1	13	b
Lubricated		0.0			*	×				0 1		0	0			.4	13	7
Self-seald,	hab	ric	3.8	еđ		e							,	ä		-1	92	le
Porcelain					0	e		0	0				0	0	0	. 1	1.0	8
Fressure re Self-conti	alne	d.	bi	uli	le	21	n		9:	66	١.					22	19	d
Single se	at,	bu	lle	13	n	1	06	0				٠					19	b
Streamlin																		
Sight feed,	gla	88						÷	w.				v	v		84	2	a
U-bolt, for	n I	73	B		(8)	10	0.0		*						4	: 3	13	Ą
_ Y	***		* ×			0 1	0					٥	0	a	d	91	12	d
Vaporizers, d										*					. 3	U	14	.72
Water treatm				D	(23)	O)	nţ											

and the same of th	Agr
Demineralizers, mono-bed B	344
Ion-exchange	239
lon-exchange, bulletin 4981	274
ion-exchange, dual bed	331
Ion-exchange materials	
HCR	79a
BAR	79h
WBR	790
Oxidant, osone	910
Plant stream analyser	254
Well water supply unitsL	445
Wire cloth	220
William Court and	245

NOW AVAILABLE -

Reprints of last month's Chemical Engineering Report

SULPHUR

SITUATION . . .

Sulphur is short. Chemical Engimeering's report tells just how short it actually is; how much sulphur we use; where it came from; where it went.

SIGNIFICANCE . . .

The shortage is caused by exports to gear the free world's defense machine. The shortage is in cheep, easily available sulphur. And there will be no mure bosenzes.

SOLUTION . . .

Sulphur using industries must economize and they must develop alternate sulphur sources and sulphur and sulphuric acid substitutes.

12 PAGES of technical and economic data—lacts and figures to put you up to date on the news-making shortage. ASK FOR: Reprint S. Price 25¢. Send arders with remittance to:

Chemical Engineering Attention: M. Molin 330 West 42nd St. New York 36, N. Y.

ADVERTISING STAFF

SALES MANAGER......Bayard E. Sawyer BUSINESS MANAGER......Albert E. Weis

Sales Representatives

ATLANTAR. C. Maultsby BOSTONW. D. Boyd	LOS ANGELESJ. H. Allen NEW YORKR. G. Frederick
CHICAGO	NEW YORK
CLEVELAND	PITTSBURGH

USE THIS HANDY READER SERVICE POST CARD

Name
Position
Company
Address
City & State

PLACE M STAMP HERE

CHEMICAL ENGINEERING
READER SERVICE DEPARTMENT
330 W. 42nd STREET
NEW YORK 18, N. Y.



CLEAN, ACCURATE SEPARATIONS

FOR A WOST OF MATERIALS

TERSON

SCREENS

Let us develop the right solution for <u>your</u> process screening problem.

Richard L. Carrow

• This unusual PATTERSON Gyro-Centric Screen installation classifies hardwood sawdust, used in a number of process applications. The product must be graded sharply in a range of sizes from 8 to 100 mesh. The installation, built and erected by Patterson, is shown before siding was applied.

The Patterson Foundry and Machine Company

Le Patterson Sympthy and Machine Company, (Conedo) Unite